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The AUTOMOBILE

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Engineering

Champion
Dependable Spark Plugs

Champion
Heavy Stone
Price $1.25

Avoid Substitutes Look for "Champion" on the Porcelain

IT IS EASY to find the spark plug that is more *profitable* for the dealer to handle and also gives the consumer better *service*—simply look for the name "Champion" *on the porcelain.*

Experienced dealers know that to point to the name "Champion" on the porcelain is their best selling argument. It makes sales easy because consumers then know the dealer is not trying to unload a substitute plug upon them.

A complete stock of Champion Spark Plugs (there is one for every type of engine) means a bigger, steadier business for the dealer without wasted selling effort.

Champion Spark Plug Co.
Toledo, Ohio

Champion Spark Plug Co. of Canada, Limited, Windsor, Ont.

Entered as second class matter Jan. 2, 1905, at the Post-office at New York, N. Y., under the Act of March 3, 1879.

EDITORIAL

Following Directions

ARE you one of the motorists who last winter used an anti-freeze compound in a manner which the maker of the preparation never specified and then condemned the stuff as being no good? If you did such a thing, you had better make sure that you followed directions to the letter. The manufacturers of anti-freeze compounds have met car and truck owners more than half way, and the complete directions printed on every label of their products are put there for but one purpose, and that is, to make sure the preparation will be used correctly.

OBVIOUSLY if the motorist does not do his part and merely dumps the stuff in his radiator, without following directions, he does wrong and one morning he will go to his unheated garage only to find the tubes of his radiator burst or the waterjacket cracked. The next thing he does is blame the anti-freeze substance, whereas, had he been careful to follow instructions he could have gone all winter without worrying about the cooling system.

MOST of the anti-freeze preparations have been put up in convenient form, but the amount of water in the cooling system together with the variation in temperature dictate to a considerable extent how the preparations must be used. All this is set forth in the maker's directions and in every case the big thing to watch is that the radiator has no leaks and that the hose couplings are in good shape. In fact, new hose is desirable before adding the anti-freeze, as after a season's use the inner layers become separated.

THE radiator should be washed out carefully with a solution of hot soda, which reveals any leaks that exist. These then should be soldered. Many anti-freeze substances attack dirt and sediment and if your radiator started to leak last winter after you added the anti-freeze, it was because you failed to clean the radiator and repair the leaks. The anti-freeze told you that leaks existed. You probably thought the anti-freeze was eating away the metal. Follow the maker's directions this winter and you will play safe.

Read Our Guarantee on

JOHNSON'S

FREEZE-PROOF

FREEZE-PROOF
JOHNSON'S
FREEZE-PROOF
Prevents Frozen Radiators
WE GUARANTEE THE CONTENTS OF THIS PACKAGE WILL HAVE NO MORE EFFECT THAN WATER ON THE METALS OF A RADIATOR OR ON RUBBER
CONTENTS 6½ Ibs NET
S.C. JOHNSON & SON
RACINE
LONDON
SYDNEY

We guarantee that Johnson's Freeze-Proof has no more effect than water on the metals of the radiator or on rubber.

If Johnson's Freeze-Proof is used according to the simple directions in the proportion shown on our scale, it will absolutely protect your radiator against damage from freezing.

We do not guarantee Johnson's Freeze-Proof when used in cars with aluminum manifolds, although it has been used satisfactorily in hundreds of such cars. Water alone often has an injurious effect on aluminum.

$1.50 Protects a Ford

One package of Johnson's Freeze-Proof (Cost $1.50) will protect a Ford to 5° below zero, and two packages to 50° below zero. For larger radiators or to protect to a lower temperature, use additional Freeze-Proof according to the scale on the package.

FOR SALE BY ALL DEALERS

Mfd. by S. C. JOHNSON & SON, Dept. A. I., RACINE, WIS.

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XL. NEW YORK—THURSDAY, JANUARY 16, 1919—CHICAGO No. 3

No British Post-War Models in Low-Price Field

From 6 to 9 Months Must Elapse Before the Makers Can Start Deliveries—Still on War Work

FOREIGN AUTOMOBILE PLANTS GREATLY EXPAND

But Manufacturers Still Adhere to Policy of Producing Few High-Priced Cars Instead of Many Low-Priced Ones—Believe Quantity Production Impossible

By David Beecroft
Directing Editor, Class Journal Co.

LONDON, ENGLAND, Jan. 15—*Special Cable*—The British automobile industry has very indefinite opinions concerning the future, and at this time has no definite program for new models.

It will be 6 months—with many factories, 9 months—before any deliveries of post-war models can be started.

A very few makers, not more than half a dozen, can be said to have post-war models ready. The remainder are putting pre-war models on the market at prices increased by 60 per cent.

Many automobile factories will have to continue for months on aviation engines and planes. Contracts for shell have been cancelled. One or two large manufacturers who have been producing aviation engines will have to continue till August on war work and cannot start to produce automobiles before that time.

There are no new Britsh post-war models in the low-price field.

Manufacturers appear more interested in $4000 and $5000 cars than they are in cheap ones.

Ford has no rival; and American automobiles selling at $1000 have few new British rivals.

Mr. Beecroft sailed for New York the day this article was cabled. He has been in Europe since November 9 as one of a party of American business paper representatives who have been the guests of the British government. The party traveled extensively in England, Scotland and France and was afforded unusual opportunity to investigate social environment, industrial pursuits and war activities. All the party returned to New York on January 2 except Mr. Beecroft, who remained to make a tour of the principal manufacturing centers of Italy

"COMMERCE, if it is to stay, must be a constructive force and never a destructive thing.

"We must serve the world if we are to be on safe foundations ourselves.

"The mere entering a foreign market by force of cut prices or of off-quality goods or by 'dumping' or by untruthful advertising, or by force of government aid or political power is in no true sense commerce, *nor will it last.*

"We must carry the flag as high in the commercial world as we have carried it before our armies.

"It means that we are going to play the game like gentlemen and make our methods such as shall survive because they render service. The ancient law has never been repealed that *'he who would be chief among you, let him be the servant of all'* and America having served with her dead and wounded sons in France must now serve the world by her factories and with her merchandise.

"That means that we must sell goods that others want and not unload those of which we would like to rid ourselves. That means we must forget there is behind the word 'foreigner' anything of implied contempt.

"That means that our visions and sympathy must be big enough for foreign trade; we must be large enough to adapt ourselves to it. If we are not, somebody else will be.

"It means that we must win upon our effectiveness, not upon our hustle, that we must carry our business far *because it is right* that it should go far on its own merit.

"It means a lot of forgetting and a lot of learning on the part of many of us." *—Wm. C. Redfield, Secretary of Commerce.*

The greatest British effort in this price-class field is Crossley, which has a post-war model to sell for $2500.

British makers still favor high-priced cars built in small quantities, rather than cheaper cars produced in greater quantities.

The Ford touring model now sells for $1000 here. This is an enormous increase and can be ascribed partly to increased cost of parts, which are purchased by the government on a cost-plus basis, and partly to higher transportation charges.

At the present time, the Ford Motor Co. is producing 3000 cars per day in its Manchester factory. These are produced by special arrangement, under which the government imports parts for the Ford company.

Want Import Duty Retained

London importers of American cars have not yet received permission to import American cars, although a united petition has been made to the government to let down the bars.

The opinion is that the government may continue total prohibition for two or three and perhaps for four months, but any action which is taken will likely be somewhat delayed because of the interference with other routine matters brought about by the Peace Conference.

In general, the opinion is strong that the majority of British automobile manufacturers will ask that the import duty be continued as at present. The opinion is strengthened by the fact that at the recent election four or five large automobile manufacturers were put into office, and it is known that they are all favorable to a combination of the present import duty.

But it is not the duty which worries British makers. Importers of *American cars do not fear the duty,* but they do fear a continuation of the total prohibition against imports as at present.

The restrictions against the importation of American commercial vehicles continue, but special petitions to the government are being heeded, and undoubtedly trucks will be permitted to be imported in limited quantities soon.

Importers of passenger automobiles are receiving permits to import sample machines which can be exhibited. However, they are not allowed to be sold.

Dealers who import French and Italian cars are making strong appeals to the government requesting permission again to take up the importation of these machines.

Over 46,000 British war trucks are to be repaired by the manufacturers and sold in Great Britain. This will extend over many months.

Truck Prices Not Abnormally High

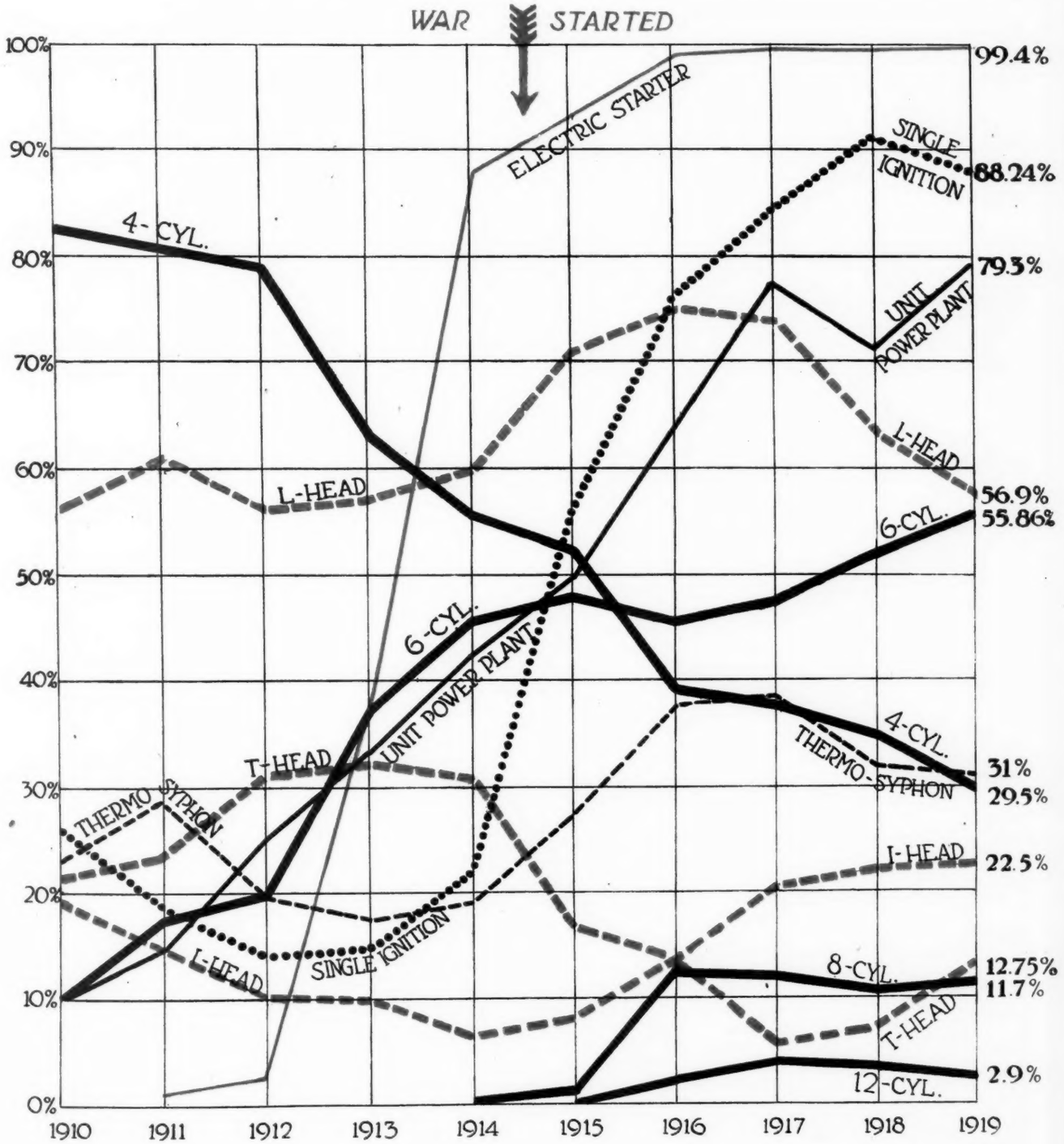
British manufacturers of trucks have reached large production, due principally to the stimulus of war, and prices are not abnormally high as is the case with passenger cars.

In general, the British manufacturer does not believe that he can install such quantity production plans as are in use in the United States, and agrees that America will monopolize the low-price market.

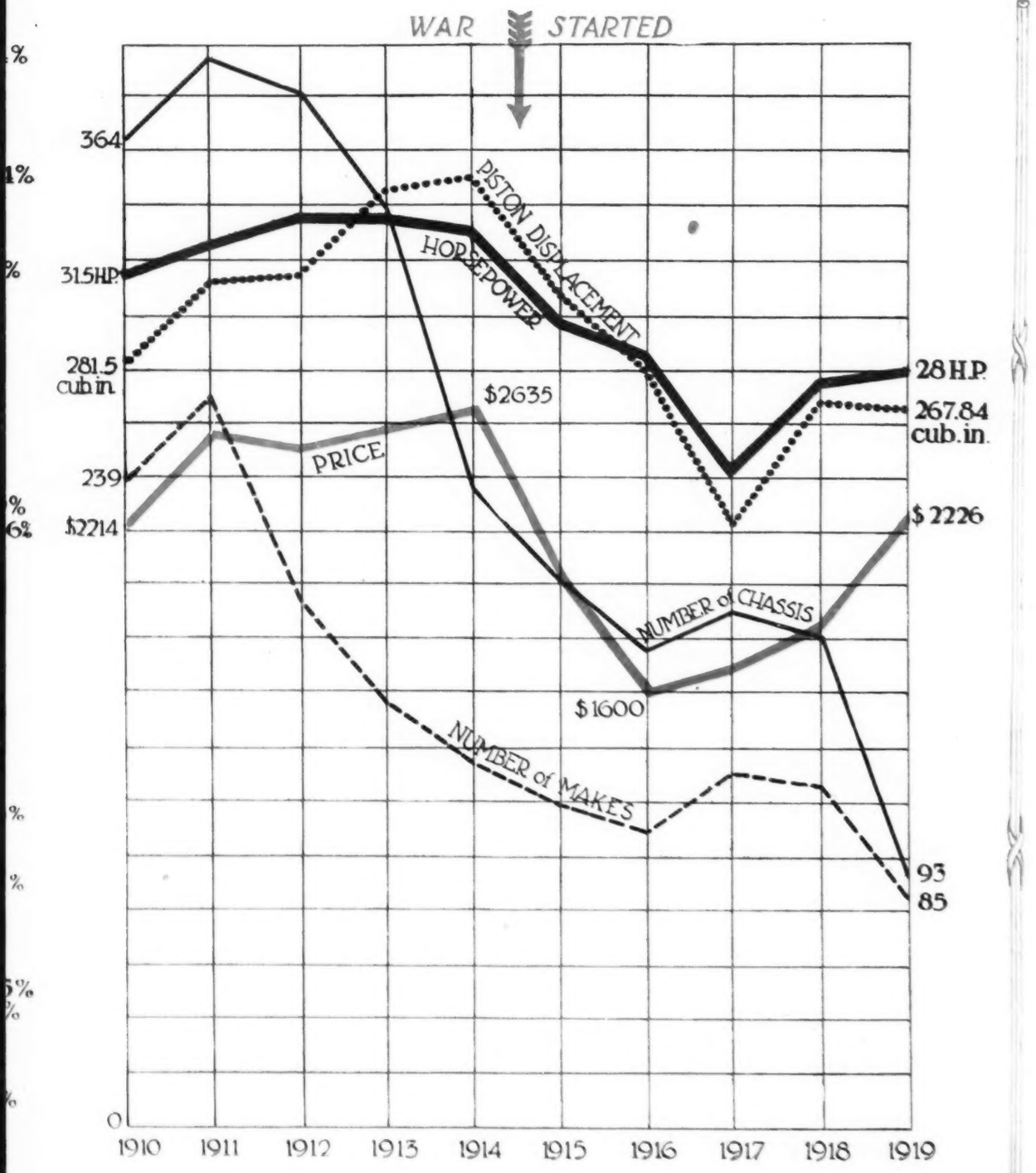
The production lessons of the war, learned in turning out munitions, have not yet been incorporated into automobile manufacture. In fact, many makers

Supplement to AUTOMOTIVE INDUSTRIES AUTOMOBILE

Trends of the American Automobile for 1
Most Important Factors in Des



r 10 Years, Showing Variations of Design and Manufacture



are quite undecided as to how to utilize the large factories—in many cases from three to five times as big as before the war—which have been built up.

These great plants are thoroughly modern. They are full of new machinery, which is mostly of American make. They have central heating plants, excellent lighting, large canteens, employees' recreation rooms, and Red Cross facilities.

Furthermore, these enlarged factories are all paid for out of profits made in war work. In addition, the companies have made large profits since the beginning of hostilities.

The growth in French and Italian factories is equally startling. Fiat, for example, has 50,000 employees; Renault has 25,000 and other French factories have grown threefold and fivefold. Here, too, makers all have excellent new, large factories, all paid for out of war profits, with a substantial profit in addition.

Renault and Fiat Post-War Models

Both Renault and Fiat have new post-war models ready for the market, and in both cases these have been designed for quantity production and low price.

Both companies are going out strong after world markets.

Hereafter, all European post-war models will have complete electric lighting and starting systems. Even old models are being fitted with such equipment.

The adoption of lighting and starting apparatus brings to light the great necessity for international standards on such parts as batteries, headlamps, and so forth. As it is now, France, Italy and England are all making batteries to different standards. This will work havoc with maintenance.

Olympia First Real Exposition

French manufacturers will show their first post-war models at the Lyons Sample Fair in March, but the revived Olympia show which is to be put on by British makers in November will in reality be Europe's first great exhibition of post-war cars.

Some of the new features that it is expected will be seen are detachable cylinder heads, valve-in-head engines and unit power plants. In general, the small engines will be block fours. But most of the new larger engines will be sixes. One or two new eight-cylinder models are expected. American body design, with the radiator the same height as the body lines is coming into vogue.

Dealers Survived War Well

British dealers have survived the war in good financial condition and are ready now to start re-selling. Many mechanics, drawn into the war, have now been demobilized and are anxious to enter the automoble business. It is expected that there may be a surplus of agencies.

Despite the fact that gasoline is now selling for $1 a gallon, the use of cars is increasing. Thousands of cars stored during the war are being brought out, cleaned up and started to running once more.

Manufacturers of ignition apparatus and other accessories whose plants were greatly enlarged during the war are all ready for a big peace production, and already the manufacture of straight-side tires has been started by the largest tire manufacturing company.

All automobile factories started to operate on a 47-hour week on January 1. Work begins at 8 a. m., with 45 minutes for lunch. The Ford company decreased its working hours from 48 to 40 per week and now assembles three more chassis per day under the shorter schedule. There have been many strikes due to the shorter hours because they upset the traditional methods of home life, women refusing in many cases to prepare late breakfasts.

Dismissing Hundreds of Women

Many of the large factories are dismissing hundreds of women employees because the labor unions insist that women gave higher production and more accurate work than men.

The manufacture of aviation engines and planes has slowed down considerably and large plane factories will be three or four months completing existing contracts. There are quantities of planes waiting for engines. However, several automobile makers have succeeded in getting airplane contracts reduced, thus permitting them to get back to car production sooner.

Progressive systems for the production of cars and trucks are used by only two companies—the Ford Motor Co. and the Associated Equipment Co., the latter being the maker of the London buses. This company has built 15,000 war trucks and is by far the largest truck maker in England.

Few Modern Assembling Methods

Other manufacturers are assembling in the old way, using hundreds of needless workers. All European factories are wofully lacking in racks and stands for materials passing through the factories. In consequence, floors are cluttered and finished parts too often are laid among the disorder. The use of electric industrial trucks is confined to a few factories and multiple spindle machinery is used in only four or five plants, and is not yet nearly as general as is the case in America.

The heads of British factories all complain that workers endeavor to do as little as possible and get as much pay as possible. At the same time, too many makers are following the same policy of selling automobiles at the highest prices and manufacturing as few as possible.

British dealers complain that British factories do not give quick service on spare parts and that service is still only vaguely understood. War has hampered such work, but there remains ground for much criticism.

During the war, British makers were greatly hampered by the government. The industry was suppressed more than was necessary. Many plants which were turned to shell production suffered great losses of skilled workers, and have now to rebuild their working forces.

British makers admit that going into war was easy as compared with the problems involved in getting back into peace production.

1919 Engineering Trends

Development Indicates Important Future Changes

Stagnation Brought About by War Has Created Unparalleled Opportunity for General Re-designing

Average Price Now on Level with the Pre-War Car and Not Likely to Go Down for Some Time

Few Mechanical Changes Because of Scarcity of New Models Brought Out Last Year

Importance of Simplifying Small Details of the Chassis Becoming Better Realized

Six-Cylinders and Overhead Valves Likely to Manifest Steadily Increasing Popularity

By A. Ludlow Clayden

IT has been the custom of AUTOMOTIVE INDUSTRIES each year to analyze the trend of automobile design and of engineering as shown in the passenger cars of the year. These analyses have hitherto always shown tendencies very clearly, and a study of the curves published one year can now be seen to have been almost invariably a true indication of what was to follow during the ensuing period.

For the successive years up to January, 1917, progress was regular and recordable, but at the end of that year it was obvious that passenger car design had been stagnated by the war. One could see the increased price due to rising material and labor markets, the lack of new models due to engineering activities being concentrated upon aircraft, tanks and multifarious other weapons.

None the less, there were changes in the tables and data published Jan. 3, 1918, because many new chassis were ready before the United States declared war.

Changes Due to Eliminations

This year such changes as appear are due mainly to eliminations. Every feature of the automobile analyzed in detail shows some change, but this is because many of those chassis included in the calculation of the averages last year have been taken off the market and have not yet been replaced by new designs. Some notable absentees will be observed by a careful study of the specification tables, and, of these, many are firms that will soon have new cars but whose experimental work is not far enough ahead to enable them to say with certainty what the specifications will be.

Of the cars remaining, many have been unchanged for nearly 2 years, so the trend curves and tabulations may be said to indicate negative development rather than positive trends. It is safe to say that in another 12 months' time a good half of the chassis now listed will be remodeled. There will be many entirely new cars—some new makes even. Price, now at a zenith, must fall again, or if the costs of material and labor remain at near their present level, then cheaper types of machines will be built—possibly smaller in size and less lavish in equipment.

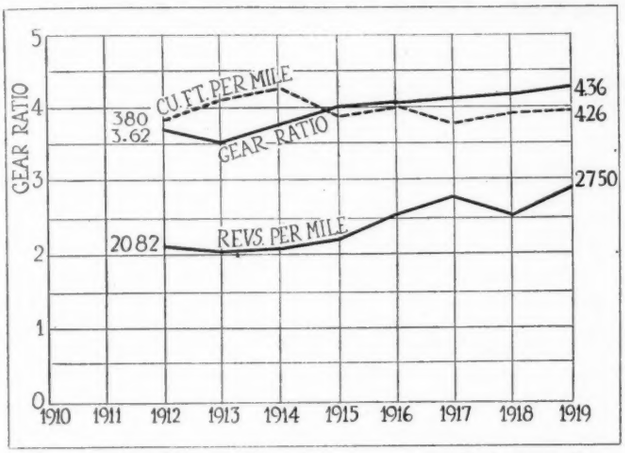
It was never so hard to predict engineering tendencies, nor was the immediate future ever so teeming with possibilities for new and good ideas. In 1915 the average engineering quality of the American passenger automobile improved enormously; it was the banner year for new cars, for higher efficiency, lighter weight and greater convenience for the owner. The year 1919 bids fair to equal if not surpass that of 1915.

Much That Is New Is Coming

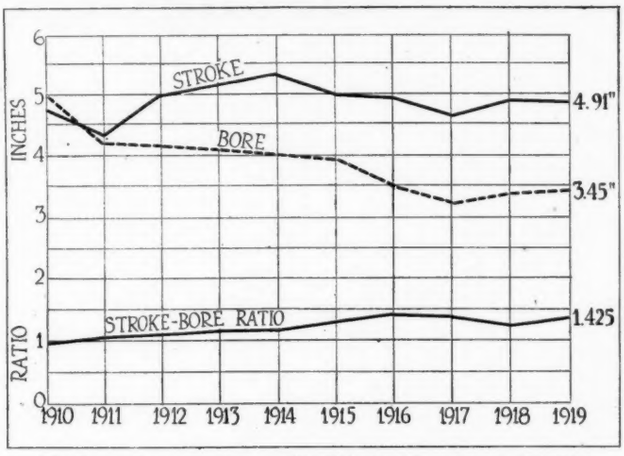
There are several reasons why much that is new should be anticipated. Firstly, owing to the aforementioned war stagnation, there is a majority of chassis which are due to change; it is time to market new models from the merchandising viewpoint.

(*Continued on page* 94)

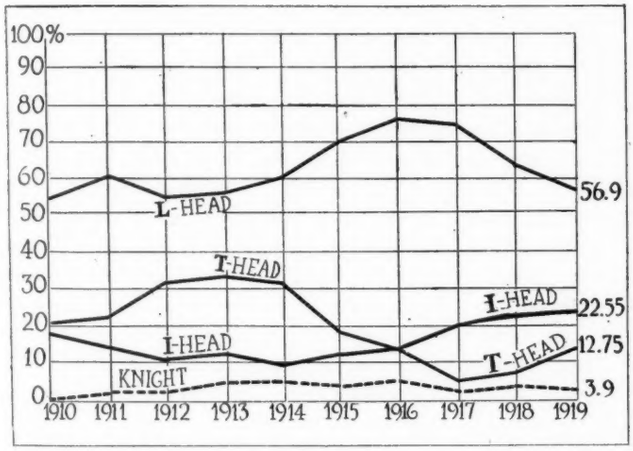
Automobile Engineering Tendencies



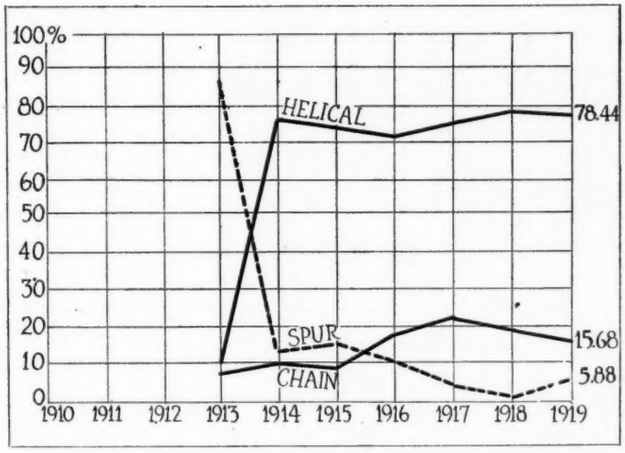
Compared with figures for the average car last year, the number of crankshaft revolutions per mile has increased from 2500 to 2750, and this, of course, has caused a corresponding increase in the number of cubic feet of mixture per mile required by the engine



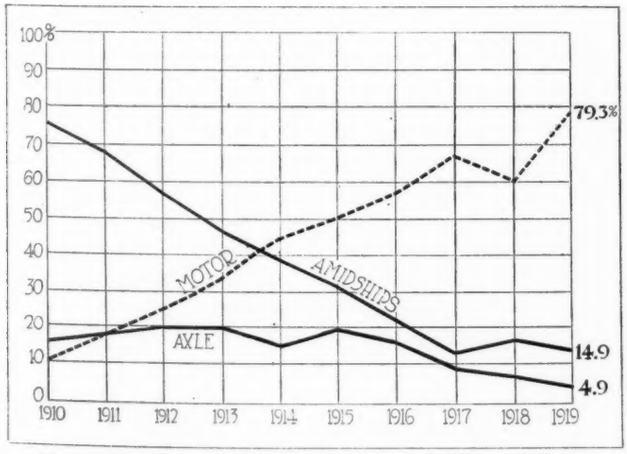
The bore of the average engine this year has decreased .03 in., whereas the stroke has increased .02 in. This accounts for a corresponding increase in the stroke-bore ratio, which amounts to 0.17. The average cylinder size of to-day is approximately 3½ by 5 in.



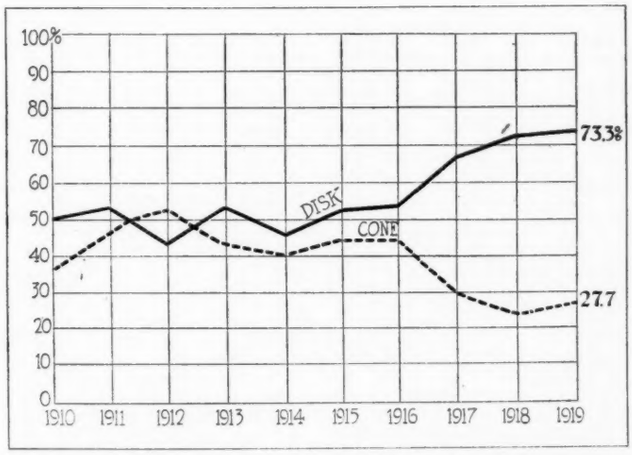
The valve-in-head engine still shows a slight increase, the figure last year being 22.2 per cent, though the gain is not as great as expected. The T-head engine shows quite an increase—from 6.8 per cent to 12.75 per cent—and the L-head has dropped from 63.5 per cent to 56.9 per cent



In the drive of accessories, tendencies have not been so closely followed. Helical still leads, after its phenomenal gain in 1914, but both this and chain have dropped off slightly this year. Spur gear drive has increased slightly from 2 per cent to 5.88 per cent



The great gain in the location of the gearset in unit with the engine, which became apparent in 1914 and 1915 and dropped off in 1918, made a big gain again this year, jumping from 71 per cent to 79.3 per cent. The two other locations both show a slight decline in use



The percentages of disk and cone clutches in use show very little change since 1916, when a decided preference for the disk type first became a noticeable trend. This year, as was the case last year, they are both holding their own

1919 Passenger Automobiles Listed

MAKE AND MODEL	Wheelbase	No of Cylinders	Bore and Stroke Inches	Piston Displacement Cubic Inches	Make of Engine	Cylinder Shape	Camshaft Drive	Water Circulation	LUBRICATION		CARBURETION		IGNITION			ELECTRIC SYS.		CLUTCH	
									System	Type of Pump	Make of Carbureter	Fuel Feed	System	Make	Control	Generator Make	Voltage	Make	Type
Allen.....41	112	4	3¾x5	221	Own.....	L...	Helical.	Ther..	Circ-Spl....	Piston....	Stromberg..	Vacuum.	Single...	Conn...	Hand..	Auto-Lite....	6	Borg & Beck.	Plate..
American.....B	122	6	3½x5	230	Rutenber....	T...	Helical.	Gear.	Circ-Spl....	Eccentric.	Zenith.....	Vacuum.	Single...	At Kent.	Hand..	Westinghouse	6	Borg & Beck.	Plate..
Anderson.....400-G	120	6	3½x5¼	303	Continental..	L...	Helical.	Cent..	Circ-Spl....	Piston....	Zenith.....	Vacuum.	Single...	.....	Hand..	Westinghouse	6	Borg & Beck.	Plate..
Anderson...400-A-C-D-E	120	6	3¼x4½	224	Continental..	L...	Helical.	Cent..	Circ-Spl....	Piston....	Zenith.....	Vacuum.	Single...	Conn...	Hand..	Westinghouse	6	Borg & Beck.	Plate..
Apperson.....8-18	130	8	3¼x5	332	Own.....	L...	Helical.	Ther..	Pressure....	Gear.....	Johnson....	Vacuum.	Single...	Remy...	Hand..	Bijur.....	6	Own.....	Plate..
Auburn.....6-39	120	6	3½x5	230	Rutenber....	....	Helical.	Cent..	Splash-Pres.	.....	Rayfield....	Vacuum.	Single...	Remy...	Hand..	Remy.....	6	Borg & Beck.	Plate..
Biddle.....H	121	4	3⅝x5⅛	226	Buda.....	L...	Helical.	Ther..	Circ-Spl....	Gear.....	Zenith.....	Vacuum.	Single...	Eiseman.	Hand..	G & D.....	6	Warner.....	D sk..
Briscoe.....B4-24	104	4	3⅛x5⅛	164	Own.....	L...	Helical.	Ther..	Circ-Spl....	Piston....	Dave-Buick.	Gravity.	Single...	Conn...	Hand..	Auto-Lite ...	6	Own.....	Cone..
Buick.....H	118–124	6	3⅜x4½	242	Own.....	I...	Helical.	.....	Circ-Spl....	.....	Marvel.....	Vacuum.	Single...	Delco...	.....	Delco.....	6	Own.....	Disk..
Cadillac.....57	125–132	8	3½x5⅛	314	Own.....	T...	Chain..	Cent..	Pressure....	Gear.....	Own.....	Pressure.	Single...	Delco...	H & A.	Delco.....	6	Own.....	Disk..
Case.....U	125	6	3½x5¼	303	Continental..	L...	Helical.	Cent..	Splash-Pres.	Piston....	Rayfield....	Vacuum.	Single...	Westing.	Hand..	Westinghouse	6	Borg & Beck.	Plate..
Chalmers.....6-30	117	6	3¼x4½	224	Own	L...	Chain..	Ther..	Splash-Pres.	Gear.....	Stromberg..	Vacuum.	Single...	Remy...	Hand..	Auto-Lite....	6	Own.....	Disk..
Chandler.....	123	6	3½x5	289	Own.....	L...	Chain..	Cent..	Circ-Spl....	Piston....	Rayfield....	Vacuum.	Single...	Bosch...	Hand..	Westinghouse	6	Borg & Beck.	Plate..
Chevrolet.....FA	108	4	3⅛x5¼	224	Own.....	I...	Helical.	Cent..	Circ-Spl....	Gear.....	Zenith.....	Vacuum	Single...	.....	Hand..	Auto-Lite....	6	Own.....	Cone..
Chevrolet.....4-90	102	4	3½x4	171	Own.....	I...	Helical.	Cent..	Circ-Spl....	Gear.....	Zenith.....	Gravity	Single...	.....	Hand..	Auto-Lite....	6	Own.....	Cone..
Chevrolet.....D	120	8	3⅜x4	286	Own.....	I...	Helical.	Cent..	Circ-Spl....	Gear.....	Zenith.....	Vacuum.	Single...	.....	Hand..	Auto-Lite....	6	Own.....	Cone..
Cole.....870	127	8	3½x4½	346	Northway...	T...	Helical.	Cent..	Pressure....	Gear.....	Stromberg..	Vacuum.	Dual....	Delco...	H & A.	Delco.....	6	Northway...	Cone..
Columbia.....Cd & CF	115	6	3¼x4½	224	Continental..	L...	Helical.	Cent..	Splash-Pres.	Piston....	Stromberg..	Vacuum.	Single...	At Kent.	Hand..	Ward-L.....	6	Borg & Beck.	Plate..
Comet.....C-51	125	6	3½x5	289	Continental..	L...	Helical.	.....	Circ-Spl....	.....	Rayfield....	Vacuum.	Single...	Delco...	Hand..	Dyneto.....	6	Borg & Beck.	Plate..
Crow-Elkhart.....K-36	115	4	3½x5	192	Gray.....	I...	Spur...	Ther..	Splash-Pres.	Gear.....	Zenith.....	Vacuum.	Single...	.....	Hand..	Dyneto.....	6	Borg & Beck.	Plate..
Cunningham.....V-3	132–142	8	3¾x5	442	Own.....	T...	Helical.	Cent..	Pressure....	Gear.....	Stromberg..	Vacuum.	Single...	Delco...	Hand..	Westinghouse	6	Brown-Lipe..	Disk..
Daniels.....B	127	8	3¼x5	332	Hersh-Sp....	L...	Helical.	Cent..	Pressure....	Gear.....	Zenith.....	Vacuum.	Single...	.....	Hand..	Westinghouse	6	Brown-Lipe..	Disk..
Dixie.....L-35	112	4	3¼x5	166	Lycoming...	L...	Helical.	Ther..	Circ-Spl....	Eccentric.	Carter.....	Vacuum.	Single...	Conn...	Hand..	Dyneto.....	6	Borg & Beck.	Plate..
Dodge Brothers.....	114	4	3⅞x4½	212	Own.....	L...	Helical.	Cent..	Circ-Spl....	Eccentric.	Stewart....	Vacuum.	Single...	.....	H & A.	North East..	12	Own.....	Disk..
Dorris.....6-80	132	6	4 x5	377	Own.....	I...	Helical.	Cent..	Pressure....	Gear.....	Stromberg..	Vacuum.	Single...	.....	Hand..	Westinghouse	6	Brown-Lipe..	Disk..
Dort.....15	105½	4	3½x5	192	Lycoming...	L...	Helical.	Ther..	Circ-Spl....	Piston....	Carter.....	Gravity.	Single...	Conn...	Hand..	Westinghouse	6	Own.....	Conc..
Elcar.....4	116	4	3½x5	192	Lycoming...	L...	Helical.	Ther..	Circ-Spl....	Eccentric.	Carter.....	Vacuum.	Single...	At Kent.	Hand..	Dyneto.....	6	Mechanics...	Disk..
Elcar.....6	116	6	3¼x4½	224	Continental..	L...	Helical.	Cent..	Splash-Pres.	Eccentric.	Stromberg..	Vacuum.	Single...	At Kent.	Hand..	Dyneto.....	6	Borg & Beck.	Plate..
Elgin.....H	118	6	3⅛x4¼	196	Falls.....	F...	Helical.	Ther..	Splash-Pres.	Gear.....	Stromberg..	Vacuum.	Single...	Wagner..	Hand..	Wagner.....	6	Borg & Beck.	Plate..
Essex.....A	108½	4	3⅜x5	179	Own.....	F...	Helical.	Ther..	Circ-Spl....	Piston....	Own.....	Vacuum.	Single...	Delco...	H & A.	Delco.....	6	Own.....	Disk..
Ford.....T	100	4	3¾x4	177	Own.....	L...	Spur...	Ther..	Splash-Grav	.....	Holley-Kng.	Gravity.	Single...	Own....	Hand..	.....	....	Own.....	Disk..
Franklin.....	115	6	3¼x4	199	Own.....	I...	Helical.	Air...	Splash-Pres.	Gear.....	Own.....	Vacuum.	Single...	At Kent.	Atmtc..	Dyneto.....	12	Borg & Beck.	Plate..
Harroun.....A-1	106	4	3¼x5¼	174	Own.....	I...	Helical.	Ther..	Splash-Pres.	Piston....	Stromberg..	Vacuum.	Single...	At Kent.	Hand..	Remy.....	6	Own.....	Cone..
Haynes.....45	127	6	3½x5	289	Own.....	L...	Helical.	Cent..	Circ-Spl....	Piston....	Rayfield....	Vacuum.	Single...	.....	Hand..	Lecce-N.....	6	Borg & Beck.	Plat...
Haynes.....46	.....	12	2¾x5	356	Own.....	I...	Chain..	Cent..	Pressure....	Gear.....	Rayfield....	Vacuum.	Single...	.....	Atmtc..	Lecce-N.....	6	Borg & Beck.	Plate.
Hollier.....198	116	8	3 x4¼	240	Own	.....	Spur...	Ther..	Splash-Pres.	Piston....	Stewart....	Vacuum.	Single...	At Kent.	Hand..	Splitdorf....	12	Own.....	Cone..
Hollier.....206	116	6	3¼x4½	224	Continental..	.....	Spur...	Cent..	Splash-Pres.	Gear.....	Stewart....	Vacuum.	Single...	Remy...	Hand..	Splitdorf....	6	Own.....	Cone..
Holmes.....N.....	126	6	3½x4¼	245	Own.....	I...	Helical	Air....	Splash-Pres.	Gear.....	Newcomb...	Vacuum.	Single...	Eiseman.	Atmtc..	Dyneto.....	12	Brown-Lipe..	Disk..
Hudson.....M	125⅝	6	3½x5	289	Own.....	L...	Helical.	Cent..	Circ-Spl....	Piston....	Own.....	Vacuum.	Dual....	Delco...	Hand..	Delco.....	6	Own.....	Disk..
Hupmobile.....R	112	4	3¼x5½	183	Own.....	L...	Chain..	Ther..	Pressure....	Gear.....	Stromberg..	Vacuum.	Single...	At Kent.	Hand..	Westinghouse	6	Own.....	Disk..
Jackson.....	118	8	3 x3½	198	Ferro.....	I...	Helical.	Ther..	Pressure....	Gear.....	Zenith.....	Vacuum.	Single...	Remy...	S-A....	Auto-Lite....	6	Borg & Beck.	Plate..
Jones.....28	125	6	3½x5¼	303	Continental..	L...	Helical.	Cent..	Splash-Pres.	Piston....	Rayfield....	Vacuum.	Single...	.....	Hand..	Westinghouse	6	Borg & Beck.	Plate..
Jordan.....	127	6	3½x5¼	303	Continental..	L...	Helical.	Cent..	Splash-Pres.	Piston....	Stromberg..	Vacuum.	Single...	.....	H & A.	Bijur.....	6	Borg & Beck.	Plate..
King.....F	120	8	3 x5	283	Own.....	....	Chain..	Ther..	Pressure....	Gear.....	Ball.....	Vacuum.	Single...	At Kent.	Hand..	Bijur.....	6	Borg & Beck.	Plate..
Kissel.....	124	6	3⅛x5½	284	Own.....	L...	Helical.	Cent..	Splash-Pres.	Gear.....	Stromberg..	Vacuum.	Single...	Remy...	Hand..	Remy.....	6	T.W.Warner.	Cone..

ABBREVIATIONS

2-pt—*Two Point*
¾ Ell—¾ *Elliptic*
¾ *Float*—¾ *Floating*
¾ Plat—¾ *Platform*
Amid—*Amidships*
Atmtc—*Automatic*
B & P—*Ball and Plain*
B & R—*Ball and Roller*
B R & P—*Ball, Roller and Plain*
C & C—*Cup and Cone*
Cant—*Cantilever*
Cent—*Centrifugal*
Circ-Spl—*Circulating Splash*
Dual-D—*Dual Double*
D V —*Dual Valve*
Ell—*Elliptic*
F—1 *Valve in Head, 1 in Side*
Float—*Floating*
Fric—*Friction*
Gear—*Gear Pump*
H—*Horizontal*
H & A—*Hand and Automatic*
I—*I-Head*
Imp—*Impeller*
K—*Knight Type*
L—*L-Head*
Mag—*Magnetic*
Non-Spl—*Non-Circulating Splash*
Opt—*Optional*
Plan—*Planetary*
Plat—*Platform*

with Their Technical Specifications

TRANSMISSION							Gear Ratio on Direct	RUNNING GEAR				Make of Steering Gear	Make of Speedometer	Crankshaft Bearings and Number	BEARINGS			MAKE AND MODEL
GEARSET			Final Drive	Torque Taken By	Make of Rear Axle	Rear Axle Type		TIRES		Wheels	Rear Springs				Gearset	Rear Axle	Front Wheel	
Make	Location	Forward Speeds						Front	Rear									
Own	Unit M.	3	Sp.B.	Springs	Adams	¾ Float.	4.45	32x3½	32x3½	Wood	S-E	Ditweiler	Stewart	Plain 2	Ball	Roller	Roller	Allen 41
Grant-Lees	Unit M.	3	Sp.B.	Springs	Salisbury.	Semi-F.	4.42	32x4	32x4	Wood	S-E	Gemmer	Van Sicklen	Plain 3	B&R	B&R	Ball	American B
Grant-Lees	Unit M.	3	Sp.B.	Springs	Columbia.	Float	3.53	33x4	33x4	Wire	S-E	Jacox	Stewart	Plain 3				Anderson 400-G
Durston	Unit M.	3	Sp.B.	Springs	Columbia.	Float	4.58	33x4	33x4	Wood	S-E	Jacox	Stewart	Plain 3	B&P		Ball	Anderson 400-A-C-D-E
Own	Amid	3	Sp.B.	Springs	Own	¾ Float.	4.25	34x4½	34x4½	Wire	¾-Ell	Own	Van Sicklen	Plain 3	Roller	B&R	Roller	Apperson 8-18
Grant-Lees	Unit M.	3	Sp.B.	Springs	Columbia.	¾ Float.	*4.42	34x4	34x4	Wood	S-E	Jacox	Stewart	Plain	Ball	B&R	Ball	Auburn 6-39
Warner	Unit M.	4	Sp.B.	Springs	American.	Float	4.41	32x4	32x4	Wire	S-E	Gemmer	Stewart	Plain 3	B&R	Roller	Roller	Biddle H
Own	Unit X.	3	Bevel.	Tor-A	Own	Semi-F.	4.23	30x3½	30x3½	Wood	Ell	Own	Stewart	Plain 2	BR&P	Roller	Ball	Briscoe B4-24
Own	Unit M.	3			Own	Float	4.07	33x4	33x4		Cant		Stewart					Buick H
Own	Unit M.	3	Sp.B.	Springs	Timken	Float	4.44-5.07	35x5	35x5	Wood	Plat	Own	Van Sicklen	Plain 3	B&R	Roller	Roller	Cadillac 57
Grant-Lees	Unit M.	3	Sp.B.	Springs	Columbia.	Float	4.45	35x4½	35x4½	Wood	S-E	Jacox	Stewart	Plain 3	B&R	Roller	Roller	Case U
Own	Unit M.	3	Sp.B.	Springs	Timken	Semi-F.	4.75	32x4	32x4	Wood	S-E	Own	Stewart	Plain 3	Roller	Roller	Roller	Chalmers 6-30
Own	Unit M.	3	Sp.B.	Tor-A	Own	¾ Float.	4.40	34x4	34x4	Wood	S-E	Opt		Ball 3	Ball	Ball	Roller	Chandler ..
Own	Unit M.	3	Bevel.	Springs	Own	¾ Float.	4.25	32x3½	32x3½	Wood	Cant	Warner		Plain 3	B&P	Roller	Ball	Chevrolet FA
Own	Unit M.	3	Bevel.	Springs	Own	¾ Float.	3.65	30x3½	30x3½	Wood	Cant	Warner		Plain 3	B&P	Roller	Ball	Chevrolet 4-90
Own	Unit M.	3	Bevel.	Tor-A	Own	¾ Float.	4.25	34x4	34x4	Wood	Cant	Own	Stewart	Plain 3	R&P	Roller	Roller	Chevrolet D
Northway	Unit M.	3	Sp.B.	Springs	Columbia.	Float	4.45	33x5	33x5	Wood	S-E	Gemmer	Stewart	Plain 3	Ball	B&R	Roller	Cole 870
Durston	Unit M.	3	Sp.B.	Springs	Timken	¾ Float.	4.75	32x4	32x4	Opt	Cant	Gemmer	Stewart	Plain 3	Ball	Roller	Roller	Columbia CD & CF
Muncie	Unit M.	3	Sp.B.	Rad-Rod	Columbia.	Semi-F.	4.50	33x4	33x4	Wood	Cant	C.A.S.	Stewart	Plain 3	Roller	Roller	Roller	Comet C-51
Covert	Unit M.	3	Bevel.	Springs	Peru	Float	4.00	32x3½	32x3½	Opt	S-E	Ditweiler		Plain 3	Ball	B&R	Roller	Crow-Elkhart K-36
Own	Unit M.	3	Sp.B.	Springs	Timken	Float	4.08	35x5	35x5	Opt	¾-Ell	Gemmer		Plain 3	B&R	Roller	Roller	Cunningham V-3
Brown-Lipe	Unit M.	3	Sp.B.	Tor-A	Timken	Float	4.08	34x4½	34x4½	Wood	S-E	Gemmer	Stewart	Plain 3	Ball		Roller	Daniels B
Grant-Lees	Unit M.	3	Sp.B.	Tor-A	Peru		4.75	32x3½	32x3½	Wood	¾-Ell	C.A.S.	Van Sicklen	Plain 2	BR&P	B&R	Ball	Dixie L-35
Own	Unit M.	3	Sp.B.	Springs	Own	Float	4.17	32x3½	32x3½	Opt	¾-Ell	Own	Johns-Man	Plain 3	Ball	Roller	Roller	Dodge Brothers
Own	Unit M.	3	Sp.B.	Springs	Timken	¾-Float.	4.08	35x5	35x5	Wood	S-E	Warner	Van Sicklen	Plain 7	Roller	Roller	Roller	Dorris 6-80
Mechanics	Unit M.	3	Bevel.	Springs	W-Weiss	¾-Float.	4.07	30x3½	30x3½	Opt	Cant	Jacox	Stewart	Plain 2	Ball	R&P	Ball	Dort 15
Mechanics	Unit M.	3	Sp.B.	Springs	Salisbury.	Float	4.50	32x3½	32x3½	Wood	S-E	Foster	Stewart	Plain 2	Ball	Roller	Roller	Elcar 4
Muncie	Unit M.	3	Sp.B.	Springs	Salisbury.	Float	4.50	33x4	33x4	Wood	S-E	Foster	Stewart	Plain 3	Ball	Roller	Roller	Elcar 6
Mechanics	Unit M.	3	Sp.B.	Tor-A	Adams	¾-Float.	5.00	33x4	33x4	Wood	Cant	C.A.S.	Van Sicklen	Plain 3	Roller	Ball	Roller	Elgin H
Own	Unit M.	3	Sp.B.	Springs	Timken	Semi-F.	4.66	32x4	32x4	Wood	S-E			Plain 3	Roller	Roller	Roller	Essex A
Own	Unit M.	2	Bevel.	Tor-T	Own	Semi-F.	3.64	30x3	30x3½	Wood	Tr.S-E	Own		Plain 3	Plain	Roller	Ball	Ford T
Own	Amid	3	Sp.B.	Springs	Own	Semi-F.	4.33	33x4½	33x4½	Wood	Ell	Own	Stewart	Plain 7	Ball	Ball	Ball	Franklin
Mechanics	Unit M.	3	Bevel.	Springs	Adams	Float	4.00	30x3½	30x3½	Wood	Cant	Gemmer	Stewart	Plain 3	Ball	Ball	Roller	Harroun A-1
Own	Unit M.	3	Sp.B.	Springs	Own	¾-Float.	4.42	34x4½	34x4½	Wood	S-E	Jacox	Stewart	Plain 3	Ball	Ball	Ball	Haynes 45
Own		3	Sp.B.	Springs	Own	¾-Float.	4.07	34x4½	34x4½	Wire	S-E	Jacox	Stewart	Plain 3	Ball	Ball	Ball	Haynes 46
Own	Unit M.	3	Bevel.	Springs	Own	Semi-F.	4.50	34x4	34x4	Wood	Cant	Own		Plain 3	Ball	Ball	Ball	Hollier 198
Own	Unit M.	3	Sp.B.	Springs	Own	Semi-F.	4.50	32x4	32x4	Wood	Cant	Gemmer		Plain 3	Ball	Ball	Ball	Hollier 206
Brown-Lipe	Unit M.	3	Sp.B.	Springs	Timken	Semi-F.	4.50	34x4½	34x4½	Wood	Ell	Gemmer	Van Sicklen	Plain 7	Roller	Roller	Roller	Holmes
Own	Unit M.	3	Sp.B.	Springs	Timken	¾-Float.	*4.90	35x4½	35x4½	Opt	S-E	Gemmer	Stewart	Plain 4	Roller	Roller	Roller	Hudson M
Own	Unit M.	3	Sp.B.	Springs	Own	¾-Float.	4.91	33x4	33x4	Wood	S-E	Jacox	Van Sicklen	Plain 3	R&P	Roller	Ball	Hupmobile R
Covert	Unit M.	3	Sp.B.	Springs	Salisbury.	¾-Float.	5.27	37x4	37x4	Wood	Ell	Foster	Stewart	Plain 3	Roller	Roller	Ball	Jackson
Brown-Lipe	Unit M.	3	Sp.B.	Springs	Timken	Semi-F.	4.45	34x4	34x4	Opt	S-E	Warner	Stewart	Plain 3	Roller	Roller	Roller	Jones 28
Detroit	Unit M.	3	Sp.B.	Springs	Timken	¾-Float.	4.08	32x4	32x4	Opt	S-E	Gemmer	Van Sicklen	Plain 3	B&P	Roller	Roller	Jordan
Own	Unit M.	3	Sp.B.	Springs	Columbia.	Float	5.00	34x4	34x4	Opt	Cant	Jacox	Stewart	Plain 3	B&R	Roller	B&R	King F
T.W.Warner	Unit M.	3	Sp.B.	Springs	Own	Float	4.58	32x4½	32x4½	Wire	¾-Ell	Jacox	Stewart	Plain 3	B&P	Roller	Roller	Kissel

Rad-Rd—*Radius Rods*
Rev-C—*Reversed Cone*
Roll—*Roller*
S-A—*Semi-Automatic*
S-E—*Semi-Elliptic*
Semi-F—*Semi-Floating*
Sp.B—*Spiral Bevel*
Sp.G—*Spiral Gear*
Splash-Pres—*Splash Pressure*
Spur—*Spur Gears*
T—*T-Head*
Ther—*Thermo-Syphon*
Tor-A—*Torsion Arm*
Tor-R—*Torsion Rod*
Tor-T—*Torsion Tube*
Tr S-E—*Transverse Semi-Elliptic*
Trans—*Transverse*
Unit-M—*Unit with Motor*
Unit-T—*Unit with Torque Tube*
Unit-X—*Unit with Axle*
Vib-Dup—*Vibrating Duplex*
†—*Wire Extra*
*Also available—3.77:1, 4.08:1 *and* 4.45:1

EQUIPMENT

At Kent—*Atwater Kent*
G.B.&S.—*Golden, Belknap & Swartz*
G. & D.—*Gray & Davis*
Hersh-Sp—*Herschell-Spillman*
Johns-Man—*Johns-Manville*
Leece-N—*Leece-Neville*
Mass-Ph—*Massnick-Phipps*
Teet-Hart—*Teetor-Hartley*
W-Weiss—*Walker-Weiss*
Ward-L—*Ward Leonard*
West-M—*Weston-Mott*

1919 Passenger Automobiles Listed with

MAKE AND MODEL	Wheelbase	No. of Cylinders	Bore and Stroke Inches	Piston Displacement Cubic Inches	Make of Engine	Cylinder Shape	Camshaft Drive	Water Circulation	LUBRICATION		CARBURETION		IGNITION			ELECTRIC SYS.		CLUTCH	
									System	Type of Pump	Make of Carbureter	Fuel Feed	System	Make	Control	Generator Make	Voltage	Make	Type
Kline 6-42-H	121	6	3¼x4½	224	Continental	L	Helical	Gear	Splash-Pres	Piston	Rayfield	Vacuum	Single	Conn	Hand	Westinghouse	6	Borg & Beck	Plate
Lexington R-19	122	6	3¼x4½	224	Continental	L	Helical	Cent	Circ-Sp	Piston	Rayfield	Vacuum	Single	Conn	Hand	Westinghouse	6	Borg & Beck	Plate
Liberty 10-B	115	6	3¼x4½	224	Continental	L	Helical	Ther	Splash Pres	Piston	Stromberg	Vacuum	Dual	Delco	Hand	Delco	6	Borg & Beck	Plate
Locomobile 38-2	139	6	4¼x5	426	Own	T	Helical	Cent	Splash-Pres	Gear	Ball	Pressure	Dual-D	Berling	Hand	Westinghouse	6	Own	Disk
Locomobile 11-48	142	6	4½x5½	525	Own	T	Helical	Cent	Splash-Pres	Gear	Ball	Pressure	Dual-D	Berling	Hand	Westinghouse	6	Own	Disk
Maibohm B	116	6	3⅛x4¼	196	Falls	I	Helical	Ther	Splash-Pres	Piston	Stromberg	Vacuum	Single	At Kent	Hand	Wagner	6	Borg & Beck	Plate
Marmon 34	136	6	3¾x5½	340	Own	I	Helical	Cent	Pressure	Gear	Stromberg	Gravity	Single	Bosch	Hand	Bijur	6	Own	Cone
Maxwell 25	108½	4	3⅝x4½	186	Own	L	Helical	Ther	Circ-Spl	Eccentric	Johnson	Vacuum	Single		Hand	Simms-Huff	12	Own	Cone
McFarlan	136	6	4½x6	573	Teetor-Hart	T	Helical	Cent	Splash-Pres	Piston	Stromberg	Vacuum	Double	Bosch	Hand	Westinghouse	6	Borg & Beck	Plate
Mercer 4	115-132	4	3¾x6¾	298	O n	L	Chain	Cent	Pressure	Gear	Ball	Vacuum	Single	Berling	Hand	Westinghouse	6	Own	Disk
Mitchell C-42	127	6	3½x5	289	Own	L	Helical	Cent	Splash-Pres	Piston	Rayfield	Vacuum	Single	Remy	Hand	Remy	6	Own	Cone
Mitchell D-40	120	6	3¼x5	249	Own	L	Helical	Cent	Splash-Pres	Piston	Rayfield	Vacuum	Single	Remy	Hand	Remy	6	Own	Cone
Moline-Knight G	122	4	4 x6	302	Own	K	Chain	Ther	Pressure	Gear	Schebler	Vacuum	Dual	Conn	Hand	Wagner	6	Own	Cone
Moline-Knight L	118	4	3¾x5	221	Own	K	Chain	Ther	Pressure	Gear	Schebler	Vacuum	Dual	Conn	Hand	Wagner	6	Borg & Beck	Plate
Monitor M & O	117	6	3¼x4½	224	Continental	L	Helical	Gear	Splash-Pres	Piston	Stromberg	Vacuum	Single		Hand	Dyneto	6	Borg & Beck	Plate
Moon 6-36-19	114	6	2⅞x4½	175	Continental		Helical	Ther	Splash-Pres	Piston	Tillotson	Gravity	Single	Delco	Atmtc	Wagner	6	Detlaff	Plate
Moon 6-66-19	125	6	3½x5¼	303	Continental	L	Helical	Cent	Splash-Pr	Piston	Rayfield	Vacuum	Single	Delco	Atmtc	Delco	6	Borg & Beck	Plate
Moore 30-C	106	4	3¾x4¼	188	G.B.& S		Chain	Ther	Splash-Pres	Piston	K-D	Gravity	Single	Conn	Hand	Auto-Lite	6		Plate
Nash 681, 2, 3, 4, 5	121-127	6	3¼x5	249	Own	I	Helical	Cent	Circ-Spl	Gear	Marvel	Vacuum	Single	Delco	H & A	Delco	6	Borg & Beck	Plate
National AF3	128	6	3½x5¼	308	Continental	L	Helical	Cent	Splash-Pres	Piston	Rayfield	Vacuum	Single	Delco	H & A	Westinghouse	6	Own	Cone
National AK	128	12	2⅞x4¾	370	Own	L	Helical	Cent	Pressure	Gear	Rayfield	Vacuum	Single	Delco	H & A	Bijur	6	Own	Cone
Oakland 34-B	112	6	2¹¹⁄₁₆x4¾	177	Own	I	Spur	Cent	Pressure	Gear	Marvel	Vacuum	Single		Hand	Remy	6	Northway	Cone
Oldsmobile 37A	112	6	2¹¹⁄₁₆x4¾	177	Northway	I	Helical	Cent	Pressure	Gear	Johnson	Vacuum	Single	Remy	Hand	Remy	6	Northway	Cone
Oldsmobile 45A	120	8	2⅞x4¾	247	Own	T	Helical	Cent	Pressure	Gear	Ball	Vacuum	Single	Delco	H & A	Delco	6	Own	Cone
Olympian 45	112	4	3¼x4½	149	Own	I	Helical	Ther	Pressure	Gear	Stromberg	Vacuum	Single	Conn	Hand	Auto-Lite	6	Borg & Beck	Plate
Overland 90	106	4	3⅜x5	179	Own	L	Helical	Ther	Circ-Spl	Piston	Tillotson	Vacuum	Single	Conn	Hand	Auto-Lite	6	Own	Cone
Owen Magnetic W-42		6	4 x5½	415	Own	I	Spur	Cent	Pressure	Gear	Zenith	Vacuum	Single	Bosch	Hand	Own	24		
Packard 3-25 3-35		12	3 x5	424	Own	T	Chain	Cent	Pressure	Gear	Own	Pressure	Single	Delco	H & A	Bijur	6	Own	Disk
Paige 6-55	127	6	3½x5¼	303	Continental	L	Helical	Cent	Splash-Pres	Piston	Rayfield	Vacuum	Single	Remy	Hand	Remy	6	Borg & Beck	Plate
Paige 6-40	117	6	3⅛x5	230	Rutenber	L	Helical	Cent	Splash-Pres	Piston	Stromberg	Gravity	Single	Remy	Hand	G & D	6	Borg & Beck	Plate
Paterson 6-48	120	6	3¼x4½	224	Continental	L	Helical	Cent	Splash-Pres	Piston	Stromberg	Vacuum	Dual	Delco	Hand	Delco	6	Borg & Beck	Disk
Peerless 56	125	8	3¼x5	332	Own	T	Helical	Cent	Pressure	Gear	Ball	Vacuum	Single	At Kent	H & A	Auto-Lite	6	Brown-Lipe	Disk
Pierce-Arrow 48B-5	142	6	4½x5½	525	Own	DV	Helical	Cent	Pressure	Gear	Own	Pressure	Double	Bosch	Hand	Westinghouse	6	Own	Cone
Pilot 6-45	120	6	3⅛x5	230	Teetor-Hart	L	Helical	Cent	Splash-Pres	Piston	Tillotson	Vacuum	Dual	Delco	Hand	Delco	6	Borg & Beck	Plate
Premier 6-C	125½	6	3⅝x5½	295	Own	I	Helical	Cent	Splash-Pres	Gear	Johnson	Vacuum	Single	Delco	Hand	Delco	6	Borg & Beck	Plate
Reo T & U	120	4	4⅛x4½	241	Own	F	Helical	Cent	Circ-Spl	Piston	Johnson	Vacuum	Single	Remy	Hand	Remy	6	Own	Disk
Revere	131	4	4⅝x6	361	Duesenberg	F	Helical	Cent	Splash-Pres	Gear	Stromberg	Vacuum	Single	Bosch	Hand	North East	6	Brown-Lipe	Plate
Roamer 6-54	128	6	3½x5¼	303	Continental	L	Helical	Cent	Splash-Pres	Piston	Stromberg	Vacuum	Single	Bosch	Hand	Bijur	6	Borg & Beck	Plate
Saxon Y-18	112	6	2⅞x4½	175	Continental	L	Helical	Ther	Circ-Spl	Piston	Stromberg	Vacuum	Single	Remy	Hand	Wagner	6	Own	Plate
Scripps-Booth 6-39	112	6	2¹¹⁄₁₆x4¾	177	Northway	I	Helical	Cent	Pressure	Gear	Marvel	Vacuum	Single	Remy	Hand	Remy	6	Northway	Cone
Seneca H	108	4	3½x4½	173	LeRoi	L	Helical	Ther	Circ-Spl		Schebler	Vacuum	Single		Hand		6	Detroit	Plate
Singer 19	139	6	4 x5½	415	Hersh-Sp	T	Helical	Cent	Pressure	Gear	Rayfield	Vacuum	Single	Bosch	Hand	Westinghouse	6	Muncie	Disk
Standard G	127	8	3¼x5	332	Hersh-Sp	L	Helical	Cent	Pressure	Gear	Zenith	Vacuum	Single	Split	Hand	Westinghouse	6	Borg & Beck	Plate
Stearns SKL4	119	4	3¾x5	221	Own	K	Chain	Cent	Splash-Pres	Gear	Schebler	Vacuum	Single	Remy	Hand	Remy	12	Own	Disk
Stephens 74-76	118	6	3¼x4½	224	Own	I	Helical	Ther	Pressure	Gear	Stromberg	Vacuum	Single	Delco	Hand	Delco	6	Borg & Beck	Plate
Studebaker EG	126	6	3⅞x5	354	Own	L	Helical	Cent	Circ-Spl	Gear	Ball	Vacuum	Single	Remy	Hand	Wagner	6	Own	Cone
Studebaker EH	119	6	3½x5	289	Own	L	Helical	Cent	Circ-Spl	Gear	Ball	Vacuum	Single	Remy	Hand	Wagner	6	Own	Cone

ABBREVIATIONS

2-pt—*Two Point*
¾ Ell—¾ *Elliptic*
¾ *Float*—¾ *Floating*
¾ Plat—¾ *Platform*
Amid—*Amidships*
Atmtc—*Automatic*
B & P—*Ball and Plain*
B & R—*Ball and Roller*
B R & P—*Ball, Roller and Plain*
C & C—*Cup and Cone*
Cant—*Cantilever*
Cent—*Centrifugal*
Circ-Spl—*Circulating Splash*
Dual-D—*Dual Double*
D V—*Dual Valve*
Ell—*Elliptic*
F—1 *Valve in Head, 1 in Side*
Float—*Floating*
Fric—*Friction*
Gear—*Gear Pump*
H—*Horizontal*
H & A—*Hand and Automatic*
I—*I-Head*
Imp—*Impeller*
K—*Knight Type*
L—*L-Head*
Mag—*Magnetic*
Non-Spl—*Non-Circulating Splash*
Opt—*Optional*
Plan—*Planetary*
Plat—*Platform*

Their Technical Specifications—Continued

TRANSMISSION								RUNNING GEAR								BEARINGS			
GEARSET			Final Drive	Torque Taken By	Make of Rear Axle	Rear Axle Type	Gear Ratio on Direct	TIRES		Wheels	Rear Springs	Make of Steering Gear	Make of Speedometer	Crankshaft Bearings and Number	MAKE AND MODEL	Gearset	Rear Axle	Front Wheel	
Make	Location	Forward Speeds						Front	Rear										
Grant-Lees..	Unit M..	3	Sp.B..	Springs...	Hess.....	¾-Float.	4.50	33x4	33x4	Wood...	¾-Ell...	Wohlrab.....	Stewart.....	Plain 3...	Kline.....6-42-H	Ball....	Ball....	Roller..	
Warner.....	Unit M..	3	Sp.B..	Springs...	Hess.....	Float....	5.00	34x4	34x4	Wood...	S-E.....	T.W.Warner.	Stewart.....	Plain 3...	Lexington.....R-19	Ball....	Roller..	Ball....	
Detroit.....	Unit M..	3	Sp.B..	Springs...	Timken..	Semi-F..	4.75	32x4	32x4	Wood...	S-E.....	Jacox.....	Stewart.....	Plain 3...	Liberty.....10-B	B&P...	Roller..	Roller..	
Own.....	Amid...	4	Sp.B..	Rad-Rod.	Own.....	Float...	4.07	35x5	35x5	Wood...	¾-Ell...	Own.....	Stewart.....	Plain 7...	Locomobile.....38-2	Ball....	Ball....	Roller..	
Own.....	Amid...	4	Sp.B..	Rad-Rod.	Own.....	Float...	.....	35x5	35x5	Wood...	¾-Ell...	Own.....	Stewart.....	Plain 7...	Locomobile.....11-48	Ball....	Ball....	Roller..	
Mechanics...	Unit M..	3	Bevel.	Springs...	.Peru....	Float...	4.50	32x3½	32x3½	Wood...	S-E.....	Jacox.....	Stewart.....	Plain 3...	Maibohm.....B	Ball....	B&R...	Ball....	
Own.....	Unit-T..	3	Sp.B..	Tor-A....	Own.....	¾-Float.	3.69-4.00	32x4½	32x4½	Wire....	Trans...	Gemmer.....	Van Sicklen..	Plain 4...	Marmon..... 34	BR&P..	B&R...	Roller..	
Own.....	Unit M..	3	Bevel.	Springs...	Own.....	¾-Float.	3.58	30x3½	30x3	Wood...	S-E.....	Own.....	Stewart.....	Plain 2...	Maxwell..... 25	R&P...	B&R...	Ball....	
Brown-Lipe..	Amid...	3	Sp.B..	Springs...	Timken..	Float...	3.50	35x5	35x5	Wood...	S-E.....	Gemmer.....	Stewart.....	Plain 4...	McFarlan.....	Roller..	Roller..	Roller..	
Own.....	Amid...	4	Sp.B..	Springs...	Own.....	Float...	3.62	32x4½	32x4½	Opt.....	S-E.....	Gemmer.....	.....	Plain 3...	Mercer.....4	Ball....	B&R...	Roller..	
Own.....	Amid...	3	Sp.B..	Springs...	Own.....	Float...	4.41	34x4	34x4	Wood...	Cant....	Own.....	.....	Plain 3...	Mitchell.....C-42	B&R...	Roller..	Roller .	
Own.....	Amid...	3	Sp.B..	Springs...	Own.....	Float...	4.41	32x4	32x4	Wood...	Cant....	Own.....	.....	Plain 3...	Mitchell.....D-40	B&R...	Roller..	Roller..	
Warner.....	Amid...	3	Sp.B..	Tor-A....	Timken..	¾-Float.	4.12	35x4½	35x4½	Wood...	Trans...	Jacox.....	.....	Plain 3...	Moline-Knight.....G	Roller..	Roller..	Roller..	
Warner.....	Amid...	3	Sp.B..	Tor-A....	Timken..	Semi-F..	4.96	34x4	34x4	Wood...	Trans...	Jacox.....	.....	Plain 3...	Moline-Knight.....L	Roller..	Roller..	Roller..	
Grant-Lees..	Unit M..	3	Sp.B..	Springs...	Adams...	Float...	4.00	33x4	33x4	Wood...	¾-Ell...	C.A.S.....	Stewart.....	Plain 3...	Monitor.....M & O	Ball....	B&R...	Ball....	
Own.....	Unit M..	3	Sp.B..	Springs...	Own.....	Float...	4.75	32x3½	32x3½	Wood...	S-E.....	Warner.....	.....	.....	Moon.....6-36-19	Ball....	Roller..	Roller..	
Warner.....	Unit M..	3	Sp.B..	Springs...	Timken..	¾-Float.	4.60	35x4½	35x4½	Wood...	S-E.....	Warner.....	.....	Plain 3...	Moon.....6-66-19	Ball....	Roller..	Roller..	
Grant-Lees..	Unit M..	3	Bevel.	Springs...	Peru.....	Float...	4.25	30x3½	30x3½	Wood...	¾-Ell...	.....	.....	Plain 3...	Moore.....30-C	Ball....	B&R...	Ball....	
Own.....	Unit M..	3	Sp.B..	Springs...	Own.....	Semi-F..	4.50	33x4	33x4	Wood...	S-E.....	Jacox.....	Stewart.....	Plain 3...	Nash.....681 2 3 4 5	Roller..	Roller..	Roller..	
Muncie.....	Unit M..	3	Sp.B..	Springs...	Columbia.	Float...	4.58	34x4½	34x4½	Wood...	Cant....	T.W.Warner.	Stewart.....	Plain 3...	National.....AF3	Ball....	Roller.	Roller..	
Muncie.....	Unit M..	3	Sp.B..	Springs...	Columbia.	Float...	4.58	34x4½	34x4½	Wood...	Cant....	T.W.Warner.	Stewart.....	Plain 3...	National.....AK	Ball....	Roller.	Roller..	
T.W.Warner.	Unit M..	3	Bevel.	Springs...	West-M..	¾-Float.	4.50	32x4	32x4	Wood...	S-E.....	Jacox.....	Stewart.....	Plain 3...	Oakland.....34-B	Ball....	B&R...	Ball....	
Warner.....	Unit M..	3	Sp.B..	Springs...	West-M..	Float...	4.58	32x4	32x4	Wood...	S-E.....	Northway...	Stewart.....	Plain 3...	Oldsmobile.....37A	B&P...	B&R...	Roller..	
Northway...	Unit M..	3	Sp.B..	Springs...	West-M..	Float...	4.61-4.91	34x4	34x4	Wood...	¾-Ell...	Jacox.....	Stewart.....	Plain 2...	Oldsmobile.....45A	B&P...	B&R...	Roller..	
Own.....	Unit M..	3	Sp.B..	Tor-A....	Peru.....	Float...	4.64	32x3½	32x3½	Opt.....	Trans...	T.W.Warner.	Stewart.....	Plain 2...	Olympian.....45	B&P...	B&R...	Ball....	
Own.....	Unit-X..	3	Sp.B..	Tor-T....	Own.....	¾-Float.	3.93	31x4	31x4	Wood...	Cant....	Own.....	Stewart.....	Plain 2...	Overland.....90	BR&P..	Ball....	Roller..	
Own.....	.....	.....	Sp.B..	Springs...	American.	Float...	4.00	35x5	35x5	Opt.....	S-E.....	Own.....	.....	Plain 3...	Owen Magnetic....W-42	Ball....	Roller..	Roller..	
Own.....	Unit M..	3	Sp.B..	Springs...	Own.....	Semi-F..	4.36	35x5	35x5	Wood...	S-E.....	Own.....	Waltham....	Plain 3...	Packard.....3-25 3-35	Ball....	Ball....	Roller.	
Own.....	Unit M..	3	Sp.B..	Tor-T....	Salisbury.	¾-Float.	4.36	35x4½	35x4½	Wood...	Cant....	Jacox.....	.....	Plain 3...	Paige.....6-55	BR&P..	B&R...	Ball....	
Own.....	Unit M..	3	Sp.B..	Tor-T....	Salisbury.	¾-Float.	4.42	33x4	33x4	Wood...	Cant....	Jacox.....	.....	Plain 3...	Paige.....6-40	BR&P..	B&R...	Roller..	
Durston.....	Unit M..	3	Sp.B..	Springs...	Hess.....	Float...	4.50	33x4	33x4	Wood...	S-E.....	Jacox.....	.....	Plain 3...	Paterson.....6-48	Ball....	Roller..	Roller..	
Brown-Lipe..	Unit M..	3	Sp.B..	Springs...	Timken..	Semi-F..	4.90	34x4½	34x4½	Wood...	Plat....	Gemmer.....	Stewart.....	Plain 3...	Peerless.....56	Roller..	Roller..	Roller..	
Own.....	Amid...	4	Sp.B..	Springs...	Own.....	Semi-F..	.....	35x5	35x5	Wood...	¾-Ell...	Own.....	Stewart.....	Plain 7...	Pierce-Arrow.....48B-5	Ball....	.....	Roller..	
Muncie.....	Unit M..	3	Sp.B..	Tor-T....	Hess.....	Float...	4.25	32x4	32x4	Wood...	Cant....	C.A.S.....	Van Sicklen..	Plain 3...	Pilot.....6-45	Ball....	B&R...	Roller..	
Detroit.....	Unit M..	3	Sp.B..	Springs...	Timken..	Semi-F..	4.45	32x4½	32x4½	Wood...	S-E.....	Warner.....	Stewart.....	Plain 3...	Premier.....6-C	Ball....	Roller..	Roller..	
Own.....	Amid...	3	Sp.B..	Springs...	Own.....	Semi-F..	4.30-4.60	34x4	34x4	Wood...	S-E.....	Own.....	Stewart.....	Plain 3...	Reo.....T & U	Roller..	Roller..	Roller..	
Brown-Lipe..	Unit M..	4	Sp.B..	Tor-A....	American.	Float...	3.50	32x4½	32x4½	Wire....	S-E.....	Gemmer.....	Stewart.....	Plain 2...	Revere.....	Ball....	Roller..	Roller..	
Grant-Lees..	Unit M..	3	Sp.B..	Springs...	Hess.....	.....	3.77	32x4	32x4	Wire....	S-E.....	Jacox.....	Stewart.....	Plain 3...	Roamer.....6-54	Ball....	Ball....	Ball....	
Own.....	Unit X..	3	Sp.B..	Tor-A....	Own.....	Semi-F..	5.00	32x3½	32x3½	Wood...	Cant....	Warner.....	Stewart.....	Plain 3...	Saxon.....Y-18	Roller..	Roller..	Roller..	
T.W.Warner.	Unit M..	3	Bevel.	Springs...	West-M..	¼-Float.	4.50	32x4	32x4	Opt.....	S-E.....	Jacox.....	Stewart.....	Plain 3...	Scripps-Booth.....6-39	B&P...	B&R...	Ball....	
Detroit.....	Unit M..	3	Sp.B..	Springs...	Adams...	Float...	4.50	30x3½	30x3½	Wood...	Cant....	Ditweiler....	Stewart.....	Plain.....	Seneca.....H	Ball....	Ball....	Roller..	
Muncie.....	Unit M..	4	Sp.B..	Tor-A....	Timken..	Float...	3.70	35x5	35x5	Wire....	Cant....	Gemmer.....	Stewart.....	Plain 3...	Singer.....19	Ball....	Roller..	Roller..	
Grant-Lees..	Unit M..	3	Sp.B..	Springs...	Timken..	Semi-F..	4.90-4.45	34x4½	34x4½	Wood...	S-E.....	Gemmer.....	Stewart.....	Plain 3...	Standard.....G	B&R...	Roller..	Roller .	
Own.....	Unit M..	3	Sp.B..	Springs...	Own.....	Semi-F..	4.50	34x4½	34x4½	Wood...	Cant....	Own.....	Stewart.....	Plain 3...	Stearns.....SKL4	B&R...	B&R...	Roller..	
Mechanics...	Unit M..	3	Sp.B..	Springs...	Opt.....	Float...	4.75	32x4	32x4	Opt.....	S-E.....	Gemmer.....	Van Sicklen..	Plain 3...	Stephens.....74-76	Ball....	B&R...	Roller..	
Own.....	Amid...	3	Sp.B..	Springs...	Own.....	Semi-F..	3.70	33x4½	33x4½	Wood...	S-E.....	Gemmer.....	.....	Plain 4...	Studebaker.....EG	R&P...	Roller..	Roller..	
Own.....	.....	3	Sp.B..	Springs...	Own.....	.....	4.00	32x4	32x4	Wood...	S-E.....	Gemmer.....	.....	Plain 4...	Studebaker.....EH	R&P...	Roller..	Roller..	

Rad-Rd—*Radius Rods*
Rev-C—*Reversed Cone*
Roll—*Roller*
S-A—*Semi-Automatic*
S-E—*Semi-Elliptic*
Semi-F—*Semi-Floating*
Sp.B—*Spiral Bevel*
Sp.G—*Spiral Gear*
Splash-Pres—*Splash Pressure*
Spur—*Spur Gears*
T—*T-Head*
Ther—*Thermo-Syphon*
Tor-A—*Torsion Arm*
Tor-R—*Torsion Rod*
Tor-T—*Torsion Tube*
Tr S-E—*Transverse Semi-Elliptic*
Trans—*Transverse*
Unit-M—*Unit with Motor*
Unit-T—*Unit with Torque Tube*
Unit-X—*Unit with Axle*
Vib-Dup—*Vibrating Duplex*
†—*Wire Extra*
*Also available—3.77:1, 4.08:1 *and* 4.45:1

EQUIPMENT

At Kent—*Atwater Kent*
G.B.&S.—*Golden, Belknap & Swartz*
G. & D.—*Gray & Davis*
Hersh-Sp—*Herschell-Spillman*
Johns-Man—*Johns-Manville*
Leece-N—*Leece-Neville*
Mass-Ph—*Massnick-Phipps*
Teet-Hart—*Teetor-Hartley*
W-Weiss—*Walker-Weiss*
Ward-L—*Ward Leonard*
West-M—*Weston-Mott*

1919 Passenger Automobiles Listed with

MAKE AND MODEL	Wheelbase	No. of Cylinders	Bore and Stroke Inches	Piston Displacement Cubic Inches	Make of Engine	Cylinder Shape	Camshaft Drive	Water Circulation	LUBRICATION		CARBURETION		IGNITION			ELECTRIC SYS.		CLUTCH	
									System	Type of Pump	Make of Carbureter	Fuel Feed	System	Make	Control	Generator Make	Voltage	Make	Type
Studebaker.....LH	112	4	3½x5	192	Own.....	L...	Helical.	Cent..	Circ-Spl....	Gear.....	Schebler....	Vacuum.	Single...	Remy...	Hand..	Wagner.....	6	Own.....	Cone..
Stutz.....G	120-130	4	4⅜x6	215	Own.....	DV.	Helical.	Cent..	Splash-Pres.	Gear.....	Stromberg..	Pressure.	Double..	.....	Hand..	Remy.....	12	Own.....	Cone..
Templar.....445	118	4	3⅜x5½	197	Own.....	I...	Chain..	Cent..	Pressure....	Gear.....	Zenith.....	Vacuum.	Single...	Remy...	H & A.	Remy.....	6	Borg & Beck.	Plate..
Tulsa.....D	117½	4	3½x5	192	Lycoming...	L...	Helical.	Ther..	Circ-Spl....	Piston....	Zenith.....	Vacuum.	Single...	Delco...	Hand..	Dyneto.....	6	Borg & Beck.	Plate..
Velie.....38	114½	6	3¼x4½	274	Continental..	L...	Helical.	Cent..	Splash-Pres.	Piston...	Rayfield....	Vacuum.	Single...	Remy...	Atmtc..	Remy.....	6	Borg & Beck.	Plate..
Velie.....39	124	6	3½x5¼	303	Continental..	L...	Helical.	Cent..	Splash-Pres.	Piston...	Rayfield....	Vacuum.	Single...	Remy...	Atmtc..	Remy.....	6	Borg & Beck.	Plate..
Westcott.....18-A	125	6	3½x5¼	303	Continental..	L...	Helical.	Cent..	Circ-Spl....	Piston...	Rayfield....	Vacuum.	Single...	Delco...	H & A.	Delco.....	6	Brown-Lipe..	Disk..
Willys-Knight.....88-4	121	4	4⅛x4½	241	Own.....	K...	Chain..	Ther..	Splash-Pres.	Piston...	Tillotson...	Vacuum.	Single...	Conn...	Hand..	Auto-Lite....	6	Own.....	Cone..
Winton.....22	138	6	4½x5¼	501	Own.....	L...	Chain..	Cent..	Pressure....	Piston...	Rayfield....	Vacuum.	Single...	Bosch...	Hand..	Bijur.....	6	.....	Disk..
Winton.....22-A	128	6	3¾x5¼	348	Own.....	L...	Chain..	Cent..	Pressure....	Piston...	Rayfield....	Vacuum.	Single...	Bosch...	Hand..	Bijur.....	6	.....	Disk..

ABBREVIATIONS

2-pt—*Two Point*
⅜ Ell—⅜ *Elliptic*
¾ *Float*—¾ *Floating*
¾ Plat—¾ *Platform*
Amid—*Amidships*
Atmtc—*Automatic*
B & P—*Ball and Plain*
B & R—*Ball and Roller*
B R & P—*Ball, Roller and Plain*
C & C—*Cup and Cone*
Cant—*Cantilever*
Cent—*Centrifugal*
Circ-Spl—*Circulating Splash*
Dual-D—*Dual Double*
D V—*Dual Valve*
Ell—*Elliptic*
F—1 *Valve in Head, 1 in Side*
Float—*Floating*
Fric—*Friction*
Gear—*Gear Pump*
H—*Horizontal*
H & A—*Hand and Automatic*
I—*I-Head*
Imp—*Impeller*
K—*Knight Type*
L—*L-Head*
Mag—*Magnetic*
Non-Spl—*Non-Circulating Splash*
Opt—*Optional*
Plan—*Planetary*
Plat—*Platform*

1919 Steam-Driven

Name and Model	Wheelbase	Type of Boiler	Boiler Location	Type of Engine	Type of Valve Gear	Type of Valves	No. of Cylinders	Bore and Stroke	LUBRICATION		Engine Location	Final Drive	Fuel
									Cylinders	Engine			
Doble.....	136	Water Tube...	Under Hood...	Dbl. Acting....	Own.....	Slide.....	2	4x5	.....	Splash.....	Rear Axle...	Spur Gear...	Kerosene....
Stanley.....	130	Fire Tube.....	Under Hood...	Dbl. Acting....	.....	Slide.....	2	4x5	Force Feed..	Splash.....	Rear Axle...	Spur Gear...	Kerosene....

1919 Engineering Trends

(*Continued from page* 88)

Secondly, many of our engineers have had their time wholly occupied by other things and they are returning to automobile work with an energy and a zest.

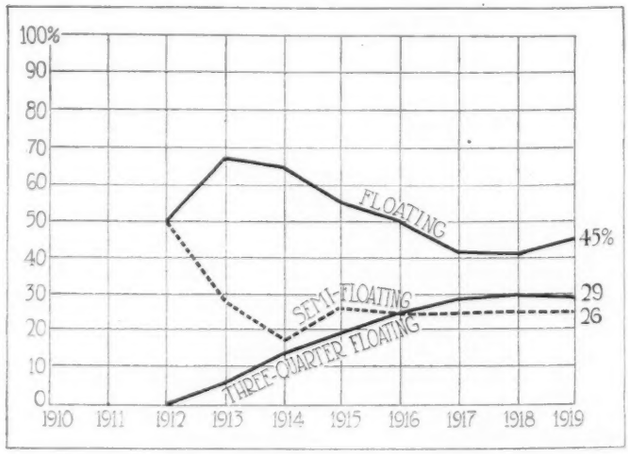
Thirdly, aviation engine manufacture, while it has produced little in the way of design which is applicable to automobles, has without doubt shown many a manufacturer new methods for making things better.

Labor is accustomed to more accurate work, the possibilities for accuracy of many tools have been improved, the number of capable inspectors has been multiplied many times. These things mean that many an engineer will now dare to ask his shop for work of a more difficult nature than he would have been able to consider two years ago. Last, but by no means least, the machine shop set up for the old model has been ripped out of a large proportion of plants, and it is as easy to tool up for a new car as to retool for the old one.

At the exact and precise effects of all these things one can do no more than guess. The one certain thing is that they will be very perceptible.

There has never before been a similar opportunity for a general redesigning. Never before has a manufacturer of years' standing been able to contemplate putting into production a completely new machine at the same cost which he would have to face in continuing the old one. This opportunity becomes of increasing importance as the factory grows larger, so there is possibility that in 1919 we shall see some great changes in the product of the very largest plants; in other words, improvements may be looked for among the cheaper cars.

The average price of the 1919 American touring car is now $2,226. This is calculated from the prices existing



There has not been a great deal of change in the preference for the three types of rear axle. During the year gone by, the three-quarter floating type has declined very slightly, but the two other methods are practically where they were last year

Their Technical Specifications—Continued

TRANSMISSION																				
GEARSET							Gear Ratio on Direct	RUNNING GEAR				Make of Steering Gear	Make of Speedometer	Crankshaft Bearings and Number	BEARINGS			MAKE AND MODEL
Make	Location	Forward Speeds	Final Drive	Torque Taken By	Make of Rear Axle	Rear Axle Type		TIRES Front	TIRES Rear	Wheels	Rear Springs				Gearset	Rear Axle	Front Wheel	
Own		3	Sp.B.	Springs	Own		4.08	32x3½	32x3½	Wood	S-E	Gemmer		Plain 3	R&P	Roller	Roller	Studebaker LH
Own	Unit X.	3	Sp.B.	Rad-Rod.	Own	¾-Float.		32x4½	32x4½	Wire	S-E	Gemmer	Stewart	Plain 3	Ball	B&R	Roller	Stutz G
Own	Unit M.	3	Sp.B.	Springs	American.	Semi-F.	4.40	32x4	32x4	Wood	S-E	Jacox	Stewart	Plain 3	B&P	B&R	Roller	Templar 445
Grant-Lees	Unit M.	3	Sp.B.	Springs	Salisbury.	Float	4.50	33x4	33x4	Opt.	S-E	C.A.S.	Stewart	Plain 2	B&P	BR&P.	Ball	Tulsa D
Durston	Unit M.	3	Sp.B.	Springs	Timken	Float	4.75	32x4	32x4	Wood	¾-Ell	Gemmer	Van Sicklen.	Plain 3	B&P	Roller	Roller	Velie 38
Warner	Unit M.	4	Sp.B.	Springs	Timken	Float	4.45–4.08	33x4½	33x4½	Wood	¾-Ell	Gemmer	Van Sicklen.	Plain 3	Ball	Roller	Roller	Velie 39
Opt.	Unit M.	3	Sp.B.	Springs	Timken	¾-Float.	4.45	32x4½	32x4½	Wood	Cant	Gemmer	Stewart	Plain 3	Roller	Roller	Roller	Westcott 18–A
Own	Unit-X.	3	Sp.B.	Tor-T.	Own	Float	4.30	34x4½	34x4½	Wood	Cant	Own	Stewart	Plain 3	BR&P.	Roller	Roller	Willys-Knight 88–4
	Unit M.	4	Sp.B.	Springs		Float	4.08	35x5	35x5	Wood	¾-Ell		Stewart	Plain 4	B&R	Roller	Roller	Winton 22
	Unit M.	4	Sp.B.	Springs		Float	4.73	35x5	35x5	Wood	¾-Ell		Stewart	Plain 4	B&R	Roller	Roller	Winton 22–A

Rad-Rd—*Radius Rods*
Rev-C—*Reversed Cone*
Roll—*Roller*
S-A—*Semi-Automatic*
S-E—*Semi-Elliptic*
Semi-F—*Semi-Floating*
Sp.B—*Spiral Bevel*
Sp.G—*Spiral Gear*
Splash-Pres—*Splash Pressure*
Spur—*Spur Gears*
T—*T-Head*
Ther—*Thermo-Syphon*
Tor-A—*Torsion Arm*
Tor-R—*Torsion Rod*
Tor-T—*Torsion Tube*
Tr S-E—*Transverse Semi-Elliptic*
Trans—*Transverse*
Unit-M—*Unit with Motor*
Unit-T—*Unit with Torque Tube*
Unit-X—*Unit with Axle*
Vib-Dup—*Vibrating Duplex*
†—*Wire Extra*
*Also available—3.77:1, 4.08:1 *and* 4.45:1

EQUIPMENT

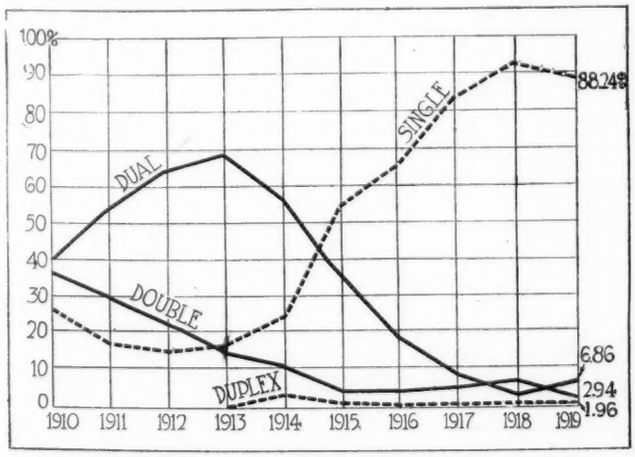
At Kent—*Atwater Kent*
G.B.&S.—*Golden, Belknap & Swartz*
G. & D—*Gray & Davis*
Hersh-Sp—*Herschell-Spillman*
Johns-Man—*Johns-Manville*
Leece-N—*Leece-Neville*
Mass-Ph—*Massnick-Phipps*
Teet-Hart—*Teetor-Hartley*
W-Weiss—*Walker-Weiss*
Ward-L—*Ward-Leonard*
West-M—*Weston-Mott*

Passenger Automobiles

Control	Fuel Feed	Type of Burner	Feed Water Control	Rear Axle Ratio	Car Drives Through	Torque Taken By	BEARINGS Rear Axle	BEARINGS Front Wheel	Wheels		Speedometer	Rear Springs	Name and Model
Throttle	Gravity	Atomizing	Pump	1.28–1	Springs	Engine Frame			35x5	35x5	Waltham	Semi-E	Doble
Automatic	Pressure	Vaporizing	Automatic	1.50–1	Springs		Timken	Timken	34x4	35x4½	Stewart	Elliptic	Stanley

Jan. 15, 1919, for 99 different cars. There are 102 chassis listed in the specification tables this year, but a few of the manufacturers withheld prices.

It is interesting to look back along the curve of price fluctuation on the large folded supplement to this issue of AUTOMOTIVE INDUSTRIES, and to observe that a similar price prevailed just before the outbreak of war in August, 1914. In January, 1910, the average price was $2,214. In 1914 the $2200 mark was crossed during the tremendous fall in average price which occurred during that year, and now the curve is back again practically on a level with the $2,214 of January, 1910.



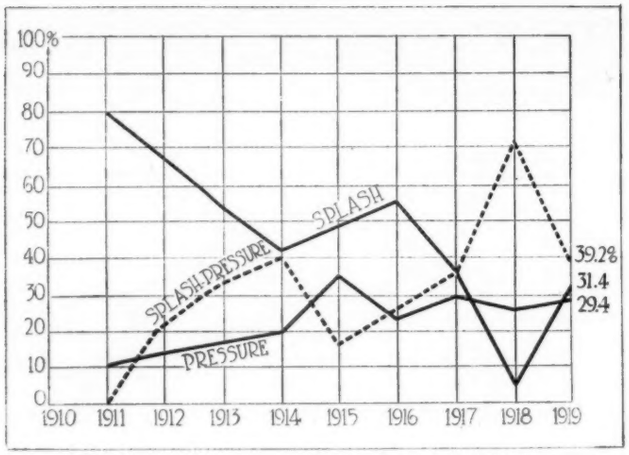
Ignition movements since 1914 have been generally consistent up to the last year when dual dropped below double. Now they have crossed again and are the same as at the end of 1917. Single ignition has dropped off very slightly

In complaining about the great increase in price caused by the war it is therefore wise to give a few moments' thought to the value now offered for $2,226 as compared with that obtainable 9 years ago for practically the same sum.

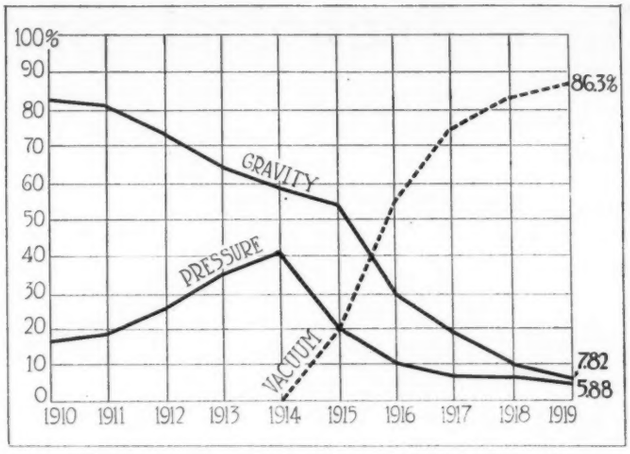
Yet again, when the cost of material and labor in 1910 is thought of and compared with to-day's figures, the amazing thing is not that prices have risen so much in the last 2 years, but that they have not gone far higher. Of course, the explanation lies in the immense improvement which has been made in manufacturing methods; it is this which enables the industry to give two or three times the value for money in automobile products.

Prices Will Not Drop

What will be the average price in January, 1920? It is a most interesting speculation. One thing is absolutely certain, and this is that it will not be very far below its present level. The industry learned its lesson, or should have done so in 1916, when prices were lowered too much owing to the false idea that the demand would not be sufficient to absorb the production. The market for high-priced cars ought to be very good indeed in America



In lubricating systems, splash has taken a decided upward trend during the last twelvemonth, gaining from 2 per cent to 31.4 per cent. Splash-pressure, on the other hand, has shown quite a drop, coming down from 71 per cent to just a little over 39 per cent



For five years now, the use of vacuum gasoline feed has shown a steady and consistent gain in favor and this year shows a further gain of from 83 per cent to 86.3 per cent. Both gravity and pressure systems show a slight decrease in popular favor

and that for cheap and moderate-priced vehicles is good throughout the world, for the whole world is calling for cars.

While there is no doubt that European competition in overseas markets will be keen, still for several years to come there is room for the absorption of all the automobiles that all the manufacturers can turn out of their shops. This means that there is no need for price cutting and it will be surprising if the average price existing a year hence will be more than two or three hundred dollars below the present average, perhaps not so much.

Few Mechanical Changes

Studying the trend curves relating to mechanical features, practically no change is to be seen, due to the lack of new designs. Many manufacturers who had new chassis ready to put into production have withheld them. Several new firms which were planning to break into the field during last year were compelled to withdraw. Thus there is no mechanical tendency deducible from the specifications which give much indication of what we may look for during 1919 in the way of engineering novelties.

It is, however, possible to forecast a little from what are known to be the ideas of some of the representative manufacturers. Here one may regard the past year as dead and can go back to 12 months ago, taking up the then clearly discernible tendencies and carry on from that point just as though 1918 had been removed from the calendar.

Doing this shows that the type of six-cylinder engine which was appearing on various new cars in 1917 is going to be a popular variety in 1919—that is to say, the medium size six of from 200 to 300 cu. in. displacement developing fairly high torque for its dimensions and having a brake mean effective pressure at the peak of its torque curve of around 100 lb.

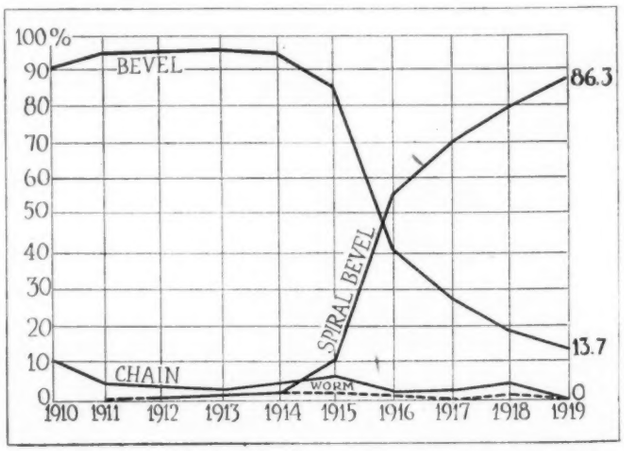
The overhead valve will be found on a large proportion of cars to be announced during the next six months partly because it is a better manufacturing job in these days of detachable cylinder heads and partly because the fuel conditions almost demand completely machined combustion chambers.

There seems little probability of many new eights or twelves. Some new fours there will be in all degrees of price, but the six will be the predominant type.

Four years ago an article published in *The Automobile* analyzed the cylinder situation and argued that if it were true that a cylinder of, say, 50 cu. in. displacement were the most desirable size, then there was room for all types of multicylinder motors according to the size and weight of car. Since that time development has rather tended to confirm the view that a cylinder of such a size is a good average, but meanwhile the size and weight of chassis have decreased, so that rather smaller motors are well able to take care of the job.

Furthermore, the eights and twelves introduced in 1915 were all new and all of a good high standard of engineering, while most of the sixes of that year were rather old and of a much lower standard. Since then the same engineering has been applied to the six, so that the difference in all-round performance between one number of cylinders and another is now more a matter of opinion than of actual fact among cars with a total piston displacement and weight of about the same value.

Again, the improvement in the design of sixes has permitted the use of lower gear ratios, so that while the piston displacement for all cars now averages only 267.4 cu. in. as compared with 307.38 cu. in. in January, 1915, the cubic feet of piston displacement per mile run on high gear has risen from 408 cu. ft. in 1915 to 426 cu. ft. in 1919. The revolutions per mile were 2300 in 1915 and are 2750 to-day.



Spiral bevel drive which first became prominent in 1915 and showed a big increase in 1916 has increased still more in popularity, rising from 79 per cent last year to 86.3 per cent this year. Both chain and worm drive have entirely disappeared

Comparison of Average American Car for Ten Years

General Averages	1919	1918	1917	1916	1915	1914	1913	1912	1911	1910
ENGINE STARTING										
Electric starter	99.4	99.4	99	98.8	94.5	87	37	2	0	0
Acetylene starter	0	0	0	0	0	1	14	0	0	0
Air	0	0	0	0	0	4	9	2	1	1
Optional	0	0	0	0	1.5	2	5	0	0	0
Mechanical	0	0	0	.0	.5	1	4	0	0	0
No starter stock	.6	0.6	1	1.2	2.5	5	31	98	99	99
FUEL FEED										
Gravity	7.8	9.7	18	31.8	57	58	65	75	81	82
Gravity pressure	....	....	1	2.4	.5	1	0	0	0	0
Pressure	5.9	6.8	7	12.0	22	41	35	25	19	18
Vacuum	86.3	83.5	74	53.8	20.5	0	0	0	0	0
GAS TANK LOCATION										
In cowl	....	....	....	No	7.2	13	....	....	....	....
At rear	....	....	....	1916	51.1	41	....	....	....	....
Under seat	....	....	....	figures	21.2	46	....	....	....	....
				avail.						
TYPE OF CLUTCH										
Disk	73.3	73.8	68	53.4	51	48	52	44	51	49
Cone	27.7	25.64	30	45.6	44	41	45	52	47	39
Expanding band	0	0	0	0	.5	3	1	3	2	6
Contracting band clutch	0	0	0	0	4.5	5	2	1	1	3
None	0	0	1	0	....	3	....	....	....	....
Electric	0	0	1	1.0	....	....	....	....	....	....
LOCATION OF GEAR-SET										
Amidship	14.9	17.6	14	20.6	32.5	39	46	55	67	75
Unit with axle	4.9	7.37	9	15.3	18.2	15	20	20	17	15
Unit with motor	79.3	71.2	77	63.5	49.3	43	34	35	16	10
None	0	0	....	0	....	3	....	....	....	....
FINAL DRIVE										
Shaft and bevel	13.7	18.32	28	41.0	84.5	93	94	92	91	89
Chain	0	1.7	1.5	1.7	4.5	4	4	6	8	11
Shaft and worm	0	0.56	0.5	.5	1.5	1	1	1	0	0
Roller	0	0	0	0	0	1	1	1	1	0
Shaft spiral bevel	86.3	79.42	70	56.8	9.5	1	....	....	....	....
TYPE OF AXLE										
Floating	45	42.35	43.5	51.8	56.5	65	67	50	0	0
Semi-floating	26	26	25.5	23.6	23.0	17	26	49	0	0
Three-quarter	29	30.5	29.5	22.8	18.5	14	4	0	0	0
Seven-eighths	....	....	0	0	0	1	0	0	0	0
Dead	....	1.15	1.5	.6	2.0	3	3	1	0	0
TIMING GEAR DRIVE										
Spur gear	5.9	2.27	4	8.4	16.1	13	83	....	....	....
Helical or spiral	78.4	79	74	73.0	73.7	77	10	....	....	....
Silent chain	15.6	17.6	21	18.1	9.1	10	7	....	....	....
Worm	0	0	1	.5	1.1	0	0	0	0	0
Bevel	0	1.13	....	....	....	....	....	....	....	....

General Averages	1919	1918	1917	1916	1915	1914	1913	1912	1911	1910
Horsepower, S.A.E. rating	28	27.4	24.3	28.66	29.97	33.2	33.60	33.60	32.7	31.5
Bore	3.45	3.43	3.37	3.57	3.82	4.12	4.19	4.34	4.42	4.85
Stroke	4.91	4.94	4.66	4.97	5.10	5.28	5.15	4.97	4.46	4.68
Stroke bore ratio	1.42	1.25	1.38	1.39	1.33	1.28	1.23	1.09	1.01	1.03
Displacement	267.8	269	222.5	278.87	307.38	349	345	316.2	313.2	281.5
Wheelbase	120.6	120.7	113.25	119.56	122.19	121	122	121	114	112
Gear ratio	4.36	4.22	4.15-1	4.08-1	3.88-1	3.6-1	3.57-1	3.62-1	....	....
Tires	32x4	34x4	31x4	23x4½	34x4	35x4½	35x4½	35x4	34x4	34x4
Number cars	....	....	....	519	535	607	....	....	....	....
Number chassis	93	180	188	176	200	236	339	381	393	364
Number makes	85	125	131	108	119	133	156	193	270	239
Price	$2226	$1822	$1687	$1600	$2005	$2635	$2585	$2508	$2560	$2214
PERCENTAGE										
NUMBER OF CYLINDERS										
One cylinder	0	0	0	0	0	0	0	1	1	5
Two cylinders	0	0	0	0	.5	1	1	1	2	3
Four cylinders	29.5	34.61	37	39.2	51.0	54	62	78	80	82
Five cylinders	0	0	0	0	0	0	1	1	0	0
Six cylinders	55.8	51.76	47	45.8	47.5	45	36	19	17	10
Eight cylinders	11.7	10.22	12	12.6	1.0	0	0	0	0	0
Twelve cylinders	2.9	3.41	4	2.4	0	0	0	0	0	0
SHAPE OF CYLINDERS										
I cylinder type	22.5	22.2	20	13.7	16.5	30	31	30	22	20
L-head	56.9	63.5	73	73.3	70.0	59	56	55	60	56
T cylinder type	12.7	6.8	5	13.0	8.5	6	9	9	14	18
Knight type	3.9	4	2	3.6	3.0	3	3	2	1	0
Two cycle	0	0	0	0	1.0	1	1	4	3	6
Gasoline electric	1	0	0	1	0	0	0	0	0	0
H	0	2.3	....	....	....	....	....	....	....	....
F	3.9	1.2	....	....	....	....	....	....	....	....
COOLING										
Air cooled	1.9	0.6	1	.6	.5	2	4	5	6	7
Thermo syphon	31	32.4	38	38.2	27	19	17	19	28	23
Pump circulating	67.1	67.0	61	61.2	72.5	79	79	76	66	70
IGNITION SYSTEMS										
Single ignition	88.2	91.04	84	76.0	56	23	15	14	18	25
Dual ignition	6.8	2.14	9	19.2	36	59	68	63	53	40
Double	2.9	5.12	3	1.8	4.55	11	15	23	29	35
Duplex	1.9	.56	3	1.8	2.0	3	0	0	0	0
ENGINE LUBRICATION										
Splash oiling	31.4	57	35	52.7	46.5	42	53	68	81	0
Splash pressure	39.2	71.6	35	23.35	16	39	32	20	0	0
Pressure oiling	29.4	26.7	30	23.35	37.5	18	14	10	19	0

So far as can be judged, it is unlikely that the gear ratios will go any lower than they are on the representative modern machine, but it is more than probable that during 1919 still more of the adherents to comparatively high gearing will follow the trend, at the same time decreasing the dimensions of their engines. Thus while the average displacement per mile is not likely to increase, the average figure for revolutions per mile may show a rise next time it comes to be determined.

The cars for 1919 are going to be exceptionally interesting because between the fall of 1914 and the spring of 1917 so many new things were tried, and the war period has given the industry a breathing space in automobile development, permitting it to observe, study and digest the performance of this and that feature in the hands of the owner.

In the three years mentioned all sorts of new engines, all sorts of new spring suspensions, new and different types of ignition, a variety of new systems of frame design, and many new styles of bodies were produced and sold. Some of these ideas were good, some bad, some indifferent; now, during the coming year, we shall be able to see clearly what was really permanent.

Looking back, it is possible to see that many of the subjects discussed, say at the S. A. E. summer meeting in 1915, were not of much importance fundamentally, although they appeared to be so at the time, while some other developments which took place quietly have become general practice almost without discussion.

As an outstanding example, the cantilever spring may be mentioned. Its introduction was of importance not because of any special virtues inherent with the *design*, but because it caused engineers to think more about springs, and so led to a great and general improvement in the riding qualities of cars. On the other hand, the deep section, stiff frame, which is of almost as great importance in giving easy riding, has crept into use everywhere, and yet the reasons for it and the way to lay it out have hardly ever been even common topics of conversation among engineers.

Importance of Simplified Details

Another important thing, which has improved the reliability of cars and decreased the cost of their production, but yet has passed unnoticed, or almost so, at engineering gatherings, is the general simplification of detail. We have better brake layouts, better wiring, better spring shackles, fewer grease cups, simpler fanbelt adjustments, better accessibility, and a host of similar things, each too small to make a subject for argument but in their sum equally great as the better engineering in our engines.

While the work of the prominent engineers has improved in laying out the broad features of their cars, so has there been a great change in the work of the lesser lights whose duty it is to detail small parts.

The American public, in fact the automobile-using public of the world, owes much to the leading American automobile engineers, but their numerous assistants, whose names are not known outside their own factories, deserve as a body at least as much credit.

It is possible that 1919 will be a year of weight reduction, and if it is not then it is safe to predict that 1920

(*Continued on page* 157)

Motor Vehicle for Every 18 Persons

United States Has 5,945,442 Cars and Trucks in Use—Gain Over Last Year 20 Per Cent—Net Increase 1,004,176

Cars and Trucks in United States, Dec. 1, 1918

ALL DUPLICATE REGISTRATION DEDUCTED

New York	453,588
Ohio	417,400
Illinois	389,135
Pennsylvania	370,110
Iowa	327,500
California	288,173
Michigan	261,167
Texas	250,083
Indiana	227,160
Minnesota	201,127
Wisconsin	196,844
Kansas	186,109
Missouri	185,146
Massachusetts	176,564
Nebraska	175,370
New Jersey	129,011
Oklahoma	120,300
Washington	119,905
Georgia	99,160
Connecticut	84,902
South Dakota	84,003
Maryland	78,146
North Carolina	72,300
Virginia	72,228
North Dakota	70,531
Colorado	70,000
Oregon	66,607
Kentucky	65,884
Tennessee	61,500
South Carolina	55,400
Montana	50,125
Florida	47,059
Alabama	46,155
Maine	42,154
Arkansas	41,458
Dist. of Columbia	40,045
Mississippi	40,000
Louisiana	39,355
West Virginia	37,025
Idaho	31,925
Rhode Island	30,595
Utah	27,204
Arizona	22,671
Vermont	20,764
New Hampshire	20,458
New Mexico	16,893
Wyoming	16,150
Delaware	12,066
Nevada	7,987
Total	5,945,442

THE number of motor vehicles in use in the United States increased 20 per cent in the 11 months between Dec. 31, 1917, and Dec. 1, 1918, thus setting a new record for distribution of one vehicle for every 18 persons, and bringing the number of vehicles in use up to within 54,588 of the six million mark. There are now 5,945,442 cars and trucks in use, as compared with 4,941,276 in 1917. This represents a gain of 1,004,176. These are net figures with all duplicate, non-resident and re-registration deducted.

The gain is not so great, of course, as was the gain the previous year when we registered 1,396,324 more vehicles than during 1915, but this was to be expected, for the last 11 months has been a period remarkable in the history of the United States. The war extensively disrupted both manufacture and commerce. The production of motor vehicles fell off 42 per cent, from 1,938,778 last year to 1,124,606 up to Dec. 1 of this year. There have been Liberty loans and other disturbing factors, but that these have not had the bad effects so freely predicted for them is indicated by the increase in registration.

Steady Gain For 7 Years

For the seven years for which accurate data are available we have shown a steady gain in registration. The gain has fluctuated to a certain extent, and reached the peak in 1916 when the percentage of increase was greatest. Following are the figures:

Year	Gain	Gain %
1918	1,004,176	20
1917	1,139,324	39
1916	1,121,164	50
1915	669,218	38
1914	501,536	40
1913	243,521	24

During the first half of 1918, the net gain in registration was 525,665, this despite the fact that six states showed a loss of 33,324 for the period. During the last half of the year, these same states not only made up all this loss, but rolled up individual increases of from 10 to 48 per cent in addition.

Ohio leads all the states for the increase it shows for the year. Last year it was New York that held first place for showing the greatest increase. Then comes Iowa, which last year was third, and following is Illinois, which has not changed. Pennsylvania, which last year

Increase in Registration Dec. 31, 1917, to Dec. 1, 1918

Ohio	83,770
New York	49,341
Iowa	49,287
Illinois	48,843
Michigan	46,166
California	45,057
Pennsylvania	44,957
New Jersey	41,590
Missouri	39,004
Indiana	37,727
Texas	36,749
Wisconsin	32,313
Kansas	31,667
Georgia	28,664
Nebraska	27,269
Washington	26,083
Maryland	22,017
Massachusetts	21,520
Oklahoma	20,101
District of Columbia	18,847
South Carolina	18,578
Kentucky	18,484
Oregon	18,475
South Dakota	16,845
Virginia	16,567
North Carolina	16,350
Alabama	13,282
Tennessee	13,000
Arkansas	12,596
Connecticut	10,260
Minnesota	9,627
Mississippi	8,350
Montana	8,229
Florida	7,843
Louisiana	7,705
Idaho	7,609
North Dakota	7,538
Utah	5,978
West Virginia	5,719
Rhode Island	5,453
Wyoming	4,149
Maine	3,655
Colorado	3,150
New Mexico	2,817
Arizona	2,781
Delaware	2,411
New Hampshire	2,312
Vermont	2,214
Nevada	1,227
Total	1,004,176

Registration of Cars and Trucks for Seven Years

All Duplicate Registration Deducted

	Dec. 31, 1912	Dec. 31, 1913	Dec. 31, 1914	Dec. 31, 1915	Dec. 31, 1916	Dec. 31, 1917	Dec. 1, 1918
Alabama	3,385	5,435	8,425	13,798	22,354	32,873	46,155
Arizona	1,624	3,445	4,774	7,320	12,122	19,890	22,671
Arkansas	2,250	3,000	5,642	8,021	14,704	28,862	41,458
California	88,699	60,000	123,101	163,801	212,918	243,116	288,173
Colorado	8,950	13,000	17,951	26,611	44,180	66,850	70,000
Connecticut	17,950	23,263	26,218	38,950	56,048	74,642	84,902
Delaware	1,732	2,373	2,894	4,924	7,520	9,655	12,066
Dist. of Columbia	11,902	15,625	8,000	10,200	13,118	21,198	40,045
Florida	6,749	8,372	11,366	13,123	14,220	39,216	47,059
Georgia	19,120	18,500	20,800	24,059	45,775	70,496	99,160
Idaho	2,500	2,173	3,272	7,093	12,996	24,316	31,925
Illinois	68,073	94,656	131,140	182,290	251,300	340,292	389,135
Indiana	54,334	44,738	65,500	96,915	139,138	189,433	227,160
Iowa	47,188	70,294	106,087	139,808	172,791	278,213	327,500
Kansas	22,000	34,366	50,467	74,956	114,304	154,442	186,109
Kentucky	5,147	7,210	11,746	19,500	31,500	47,400	65,884
Louisiana	7,000	7,200	3,500	10,880	20,014	31,650	39,355
Maine	7,743	10,570	14,300	18,600	28,951	38,499	42,154
Maryland	10,487	14,254	20,213	27,638	33,364	56,129	78,146
Massachusetts	51,229	60,826	76,832	89,133	136,790	155,044	176,564
Michigan	39,579	54,366	76,389	114,845	159,639	215,001	261,167
Minnesota	29,000	37,800	67,365	91,829	137,500	191,500	201,127
Mississippi	2,895	3,000	3,894	11,500	20,474	31,650	40,000
Missouri	24,379	38,140	50,998	76,462	107,865	146,142	185,146
Montana	2,000	5,686	10,706	14,520	24,585	41,896	50,125
Nebraska	33,861	47,274	50,000	59,140	101,201	148,101	175,370
Nevada	900	1,131	1,487	2,177	4,609	6,760	7,987
New Hampshire	5,764	7,420	8,738	10,819	14,338	18,146	20,458
New Jersey	35,439	39,288	58,820	67,556	75,108	87,421	129,011
New Mexico	911	1,721	3,090	4,947	8,028	14,086	16,893
New York	105,546	122,411	156,173	212,844	279,406	404,247	453,588
North Carolina	6,178	10,000	14,815	21,160	35,150	55,950	72,300
North Dakota	8,975	12,968	17,348	24,678	41,761	62,993	70,531
Ohio	63,066	86,054	121,265	179,767	252,179	333,630	417,400
Oklahoma	6,524	7,934	7,360	25,615	52,718	100,199	120,300
Oregon	10,165	13,957	16,347	23,758	30,917	48,132	66,607
Pennsylvania	59,357	76,178	107,141	150,729	230,648	325,153	370,110
Rhode Island	7,565	9,894	12,331	16,362	21,406	25,142	30,595
South Carolina	10,000	11,500	15,000	14,500	19,000	36,822	55,400
South Dakota	14,481	14,578	20,080	29,336	44,271	67,158	84,003
Tennessee	9,973	14,103	19,668	27,266	31,400	48,500	61,500
Texas	35,187	54,362	64,732	90,000	197,687	213,334	250,083
Utah	2,576	4,021	6,139	7,994	13,507	21,226	27,204
Vermont	4,183	5,430	7,613	11,499	14,251	18,550	20,764
Virginia	5,760	9,022	13,985	21,357	35,426	55,661	72,228
Washington	13,990	24,176	30,253	36,905	62,546	93,822	119,905
West Virginia	5,349	5,088	7,217	13,256	20,437	31,306	37,025
Wisconsin	24,578	34,646	53,180	81,371	117,603	164,531	196,844
Wyoming	3,300	1,584	2,428	3,976	7,125	12,001	16,150
	1,009,513	1,253,034	1,754,570	2,423,788	3,544,952	4,941,276	5,945,442

was the third greatest gainer, this year has dropped down to sixth place.

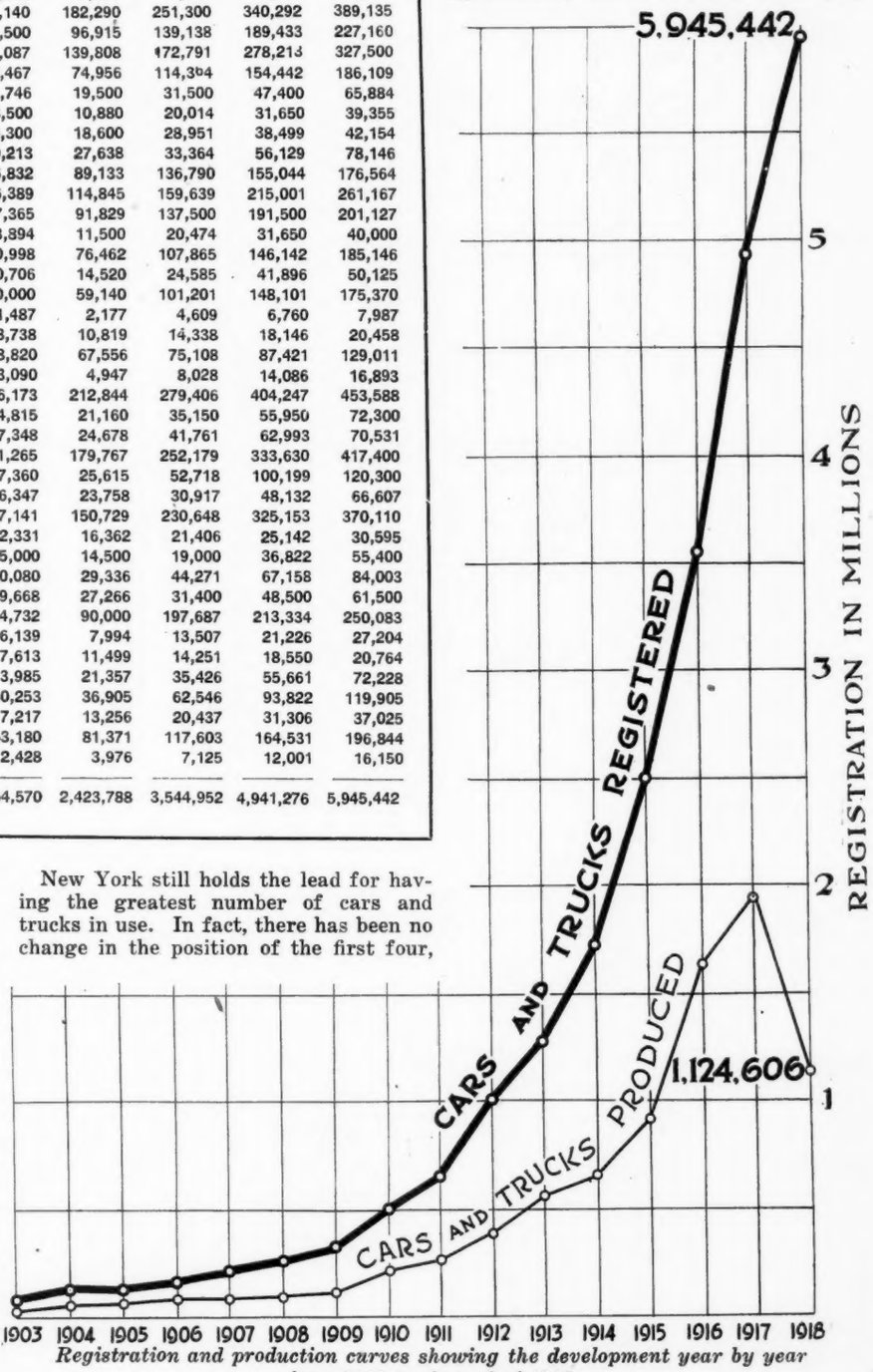
But though Ohio made the greatest gain, numerically, the District of Columbia was far ahead of all the states in percentage of gain. The fact that the District registered 89 per cent more cars this year than last will serve as some indication of the great influx into the National capital during the war. Last year there were 21,198 cars and trucks in the district, as against 40,045 this year.

In 1917 it was Florida that registered the greatest gain in percentage, the figure being 176 per cent. This year, however, the increase was but 20 per cent. South Carolina is in practically the same position this year as she was last. She registered a gain of 50 per cent this year and 89 per cent last. The District of Columbia and South Carolina were the only ones to show more than 50 per cent increase in registration.

New York still holds the lead for having the greatest number of cars and trucks in use. In fact, there has been no change in the position of the first four, Ohio being second, Illinois third and Pennsylvania fourth. Iowa has moved up from seventh place to fifth and Michigan has moved up from ninth to seventh; California dropped back from fifth to sixth.

Gains are Scattered

Among the states that have made the greatest gains, it is somewhat unusual that these are not grouped to the extent they were last year. For example, both Ohio and New York which head the list of gainers, are more manufacturing centers than they are agricultural. Iowa, which is third, is undoubtedly principally agricultural, but Illinois and Michigan,



Registration and production curves showing the development year by year from 1903 to the end of 1918.

Distribution of cars and trucks in the United States, all duplicates being deducted

Registrations of Cars, Trucks and Motorcycles, Dec. 1, 1918

State or Territory	Gross Vehicle Registration	New Vehicle Registration	Registration up to July 1, 1918	Gasoline Passenger Cars in Use	Gasoline Commercial Cars in Use	Electric Passenger Cars in Use	Electric Commercial Cars in Use	Motorcycles	Non-Resident Registrations**	Re-Registered***	Chauffeurs Registered	Tota Fees
Alabama	46,155	1,296	44,859	*40,639	*5,516	.....	.....	1,180	.....	.....	2,455	$456,619
Arizona	23,875	2,695	21,180	23,870	.....	5	.....	684	.....	1,204	3,895	140,291
Arkansas	41,458	2,458	39,000	.....	.....	.....	.....	.....	.....	.....	.....	410,060
California	337,878	46,211	291,667	*317,737	*20,141	.....	.....	24,752	9,000	40,705	12,361	3,501,320
Colorado	80,000	8,400	71,600	75,000	*4,600	400	.....	5,000	10,000	.....	12,000	340,400
Connecticut	84,902	9,002	75,900	*69,851	*15,051	.....	.....	4,525	.....	.....	96,730	1,285,164
Delaware	12,955	1,826	11,129	.....	.....	.....	.....	707	.....	889	15,905	232,195
Dist. of Col.	47,514	10,545	36,969	42,082	4,780	652	.....	2,457	7,469	.....	23,552	190,401
Florida	‡47,059	.....	42,846	.....	.....	.....	.....	.....	.....	.....	.....	.....
Georgia	99,160	9,679	89,481	92,000	7,000	150	10	964	.....	.....	4,867	293,473
Idaho	32,282	4,472	27,810	.....	.....	.....	.....	707	.....	357	968	560,930
Illinois	389,135	26,393	362,742	.....	.....	.....	.....	10,825	.....	.....	45,360	2,592,382
Indiana	227,160	19,779	207,381	.....	.....	.....	.....	9,111	.....	.....	4,641	1,256,539
Iowa	327,500	2,500	325,000	*320,000	*7,500	.....	.....	2,150	.....	.....	.....	.....
Kansas	189,952	4,952	185,000	.....	.....	.....	.....	4,171	.....	3,843	.....	979,620
Kentucky	65,884	8,341	57,543	.....	.....	.....	.....	.....	.....	.....	.....	402,250
Louisiana	39,760	2,160	37,600	.....	.....	.....	.....	399	.....	405	.....	.....
Maine	44,572	6,123	38,439	40,372	4,200	.....	.....	.....	.....	2,418	.....	570,119
Maryland	78,146	17,134	61,012	69,574	6,747	1,213	612	5,347	.....	.....	18,487	909,459
Massachusetts	193,497	36,699	156,798	*160,486	*33,011	.....	.....	12,862	11	16,922	52,964	4,332,612
Michigan	261,547	24,566	236,981	*235,219	*26,328	.....	.....	7,805	380	.....	24,809	2,797,806
Minnesota	203,727	15,018	188,709	*197,727	*6,000	.....	.....	5,127	.....	2,600	4,400	1,037,535
Mississippi	40,000	2,500	37,500	*38,000	*2,000	.....	.....	.....	.....	.....	.....	.....
Missouri	187,646	22,856	164,790	.....	.....	.....	.....	3,968	.....	2,500	21,500	1,393,528
Montana	51,050	4,185	46,865	.....	.....	.....	.....	852	.....	925	1,470	350,913
Nebraska	175,370	15,870	159,500	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nevada	8,160	535	7,625	*7,836	*324	.....	.....	115	.....	173	.....	33,045
New Hampshire	24,904	3,674	21,230	.....	.....	.....	.....	2,452	1,446	3,000	9,603	379,24
New Jersey	154,870	30,351	124,519	*139,269	*15,601	.....	.....	12,843	.....	25,859	199,920	2,210,364
New Mexico	‡16,893	.....	15,745	.....	.....	.....	.....	.....	.....	.....	.....	.....
New York	457,924	35,071	422,853	364,945	*92,979	.....	.....	28,550	4,336	.....	145,750	4,648,192
North Carolina	72,300	10,354	61,946	.....	.....	.....	.....	.....	.....	.....	.....	422,710
North Dakota	71,687	2,863	68,824	.....	.....	.....	.....	1,657	.....	1,156	.....	457,538
Ohio	417,400	1,438	415,962	.....	.....	4,400	.....	20,000	.....	.....	.....	2,151,706
Oklahoma	120,300	28,600	91,700	.....	.....	.....	.....	1,610	.....	.....	.....	1,130,714
Oregon	66,607	9,541	57,066	63,307	*3,200	100	.....	4,275	None	None	3,089	.....
Pennsylvania	393,972	69,788	324,184	*362,827	*31,145	.....	.....	26,612	.....	23,862	78,644	3,902,420
Rhode Island	‡30,595	4,196	26,399	*24,969	5,626	.....	.....	1,942	.....	.....	37,213	380,000
South Carolina	55,400	7,450	47,950	.....	.....	.....	.....	2,246	.....	.....	.....	306,894
South Dakota	86,121	14,321	71,800	.....	.....	.....	.....	1,168	.....	2,118	.....	282,742
Tennessee	65,000	13,100	51,900	.....	.....	.....	.....	1,100	.....	3,500	.....	402,000
Texas	250,201	51,832	198,369	.....	.....	.....	.....	3,250	118	.....	22,455	1,993,695
Utah	27,204	3,354	23,850	*22,135	*5,069	.....	.....	1,311	.....	.....	1,521	229,203
Vermont	22,550	2,785	19,765	20,671	1,870	8	1	734	.....	1,786	3,748	398,691
Virginia	72,228	7,228	65,000	.....	.....	.....	.....	2,440	.....	.....	4,760	680,000
Washington	119,905	19,183	100,722	*103,219	*16,686	.....	.....	6,475	.....	.....	.....	868,917
West Virginia	38,600	4,229	34,371	.....	.....	.....	.....	847	.....	1,575	3,712	455,715
Wisconsin	196,844	14,144	182,700	*189,983	*6,861	.....	.....	7,246	.....	.....	.....	2,045,451
Wyoming	16,150	2,000	14,150	.....	.....	.....	.....	288	.....	.....	.....	76,925
Total	6,114,349	659,459	5,466,931	3,021,718	322,235	6,928	623	230,754	32,760	135,797	856,779	$47,489,760

NOTE—Steam cars and trucks are included with the gasoline vehicle figures, as segregation is not carried out by registration officials.
**Number of vehicles owned by citizens of other states. ***Number of vehicles re-registered owing to change of ownership, transfer, etc.
*Includes electrics. ‡Estimated.

Distribution of Manufacturers by States

State	Cars	Trucks	Motor-cycles	Tractors	Aircraft	Engines	Number of Names
Alabama	.....	.....	.....	.....	.....	.....	.....
Arizona	.....	.....	.....	.....	.....	.....	.....
Arkansas	.....	.....	.....	1	.....	.....	1
California	2	12	.....	7	2	.....	20
Colorado	1	.....	.....	.....	.....	.....	1
Connecticut	2	2	.....	.....	1	2	6
Delaware	.....	.....	.....	.....	.....	.....	.....
Dist. of Col.	.....	1	.....	.....	.....	.....	1
Florida	.....	.....	.....	.....	.....	.....	.....
Georgia	1	2	.....	.....	.....	.....	3
Idaho	.....	.....	.....	.....	.....	.....	.....
Illinois	21	39	2	23	2	3	78
Indiana	20	9	.....	8	.....	5	39
Iowa	.....	6	.....	10	.....	1	18
Kansas	1	2	.....	1	.....	.....	3
Kentucky	2	2	.....	1	.....	.....	4
Louisiana	1	1	.....	.....	1	.....	3
Maine	.....	.....	.....	1	.....	.....	1
Maryland	1	1	.....	.....	.....	.....	1
Massachusetts	4	11	3	2	2	.....	20
Michigan	34	48	.....	16	1	16	101
Minnesota	4	8	.....	24	.....	2	37
Mississippi	.....	.....	.....	.....	.....	.....	.....
Missouri	4	6	.....	7	1	.....	17
Montana	.....	.....	.....	.....	.....	.....	.....
Nebraska	1	3	.....	2	.....	.....	5
Nevada	.....	.....	.....	.....	.....	.....	.....
New Hampshire	.....	1	.....	.....	.....	.....	1
New Jersey	2	7	.....	1	4	1	16
New Mexico	.....	.....	.....	.....	.....	.....	.....
New York	15	31	2	6	12	7	75
North Carolina	2	.....	.....	.....	.....	.....	2
North Dakota	.....	.....	.....	1	.....	.....	1
Ohio	24	31	1	13	3	5	69
Oklahoma	3	3	.....	1	1	.....	6
Oregon	.....	.....	.....	.....	.....	.....	.....
Pennsylvania	6	26	1	4	.....	6	41
Rhode Island	.....	1	.....	.....	1	.....	.....
South Carolina	1	.....	.....	.....	.....	.....	1
South Dakota	.....	.....	.....	2	.....	.....	2
Tennessee	.....	.....	.....	.....	.....	.....	.....
Texas	2	2	.....	2	.....	.....	4
Utah	.....	.....	.....	.....	.....	.....	.....
Vermont	.....	.....	.....	.....	.....	.....	.....
Virginia	2	1	.....	1	1	.....	4
Washington	.....	5	.....	2	1	.....	8
W. Virginia	1	1	.....	.....	1	.....	2
Wisconsin	6	11	2	14	1	7	38
Wyoming	.....	.....	.....	.....	.....	.....	.....
Canada	12	8	.....	3	.....	.....	19
Total	175	281	11	153	35	55	649

Distribution of Wholesale and Retail Dealers by States

States	Jobbers	Exclusive Supply Houses	Dealers	Garages	Repairs	Companies with Supply Department	Number of Names
Alabama	2	25	183	118	81	52	289
Arizona	.....	14	122	114	57	44	217
Arkansas	1	17	239	163	69	54	344
California	19	164	1,448	1,452	937	481	2,637
Colorado	3	22	385	376	178	138	596
Connecticut	7	87	419	468	277	146	812
Delaware	.....	7	65	69	25	20	105
Dist. of Col.	2	21	56	48	27	9	127
Florida	2	34	249	252	146	101	453
Georgia	2	62	553	393	185	106	865
Idaho	1	11	173	148	65	71	240
Illinois	18	134	2,049	2,047	1,027	615	3,404
Indiana	10	65	963	821	360	271	1,510
Iowa	9	65	1,711	1,473	795	720	2,546
Kansas	8	35	964	498	412	333	1,526
Kentucky	3	21	314	244	83	74	438
Louisiana	3	20	178	102	56	34	256
Maine	3	18	346	312	135	123	566
Maryland	2	27	244	247	108	73	420
Massachusetts	15	141	772	955	419	234	1,620
Michigan	7	98	947	846	333	292	1,526
Minnesota	15	43	1,095	883	480	305	1,519
Mississippi	.....	12	132	107	43	40	197
Missouri	17	60	828	715	367	211	1,387
Montana	2	15	263	246	117	89	392
Nebraska	12	20	879	716	267	204	1,207
Nevada	.....	4	61	55	25	19	91
New Hampshire	.....	9	177	216	103	91	301
New Jersey	1	86	680	928	456	251	1,446
New Mexico	.....	6	105	95	41	45	160
New York	16	332	1,960	2,438	1,151	709	4,171
North Carolina	1	27	337	278	110	94	492
North Dakota	1	9	473	358	172	132	652
Ohio	27	146	1,677	2,402	624	476	2,606
Oklahoma	4	30	522	465	156	135	828
Oregon	3	26	238	232	116	72	398
Pennsylvania	14	216	1,885	1,830	812	641	3,185
Rhode Island	5	13	95	140	91	20	266
South Carolina	2	18	242	143	68	54	342
South Dakota	3	9	444	357	146	99	638
Tennessee	3	25	243	150	106	59	372
Texas	9	95	1,005	933	308	219	1,620
Utah	3	17	94	65	36	24	156
Vermont	.....	8	168	161	87	94	268
Virginia	2	48	305	216	100	68	461
Washington	6	51	417	352	175	92	656
W. Virginia	.....	16	268	162	66	59	347
Wisconsin	7	51	1,090	943	407	321	1,508
Wyoming	.....	8	82	73	38	25	123
Hawaii	.....	5	14	12	14	9	27
West Indies	.....	4	27	24	3	9	42
Canada	19	84	1,030	858	330	206	1,510
Mexico	2	2	10	11	3	2	18
Total	291	2583	29,226	27,710	12,791	8865	47,883

The total under the heading "Number of Names" in the table at the right represents the number of individual establishments. This is not a total of the individual columns. For example, the dealer may or may not operate a garage, repairshop, supply department, etc. These two tables were compiled by the Automobile Trade Directory

which come next, are only partly agricultural. And so it goes: California is a fruit-growing state; Pennsylvania is partly agricultural, partly mining and partly industrial; New Jersey is industrial; Missouri is farming and so is Indiana; Texas, Wisconsin and Kansas are agricultural.

On the whole, the greatest gain has been made among the agricultural states, which is a condition that has obtained for several years, and is particularly understandable this year because of the increased importance and purchasing power of the farmer.

Here, for example, are figures on a group of leading agricultural states which in each instance show gains:

State	1917	1918
No. Dak	62,993	70,531
Neb.	148,100	175,370
Kansas	154,442	186,109
Minn.	191,500	201,127
Wis.	164,531	196,844
Iowa	278,213	327,500
Total	1,066,938	1,241,484

Registration and Population Dec. 1, 1918

State	Pop. Est. 1918	Cars and Trucks	Pop. per Car
Iowa	2,224,771	327,500	7
Nebraska	1,296,877	175,370	7
Dist. of Col.	374,584	40,045	9
So. Dakota	735,434	84,003	9
Kansas	1,874,195	186,109	10
Montana	486,376	50,125	10
California	3,119,412	288,173	11
No. Dakota	791,437	70,531	11
Arizona	272,034	22,671	12
Michigan	3,133,678	261,167	12
Minnesota	2,345,287	201,127	12
Wyoming	190,380	16,150	12
Indiana	2,854,167	227,160	13
Ohio	5,273,814	417,400	13
Oregon	888,243	66,607	13
Wisconsin	2,553,983	196,844	13
Colorado	1,014,581	70,000	14
Idaho	461,766	31,925	14
Nevada	114,742	7,987	14
Washington	1,660,578	119,905	14
Connecticut	1,286,268	84,902	15
Illinois	6,317,734	389,135	17
Utah	453,648	27,204	17
Delaware	216,914	12,066	18
Maryland	1,384,539	78,146	18
Texas	4,601,279	250,083	18
Vermont	366,192	20,764	18
Maine	782,191	42,154	19
Missouri	3,448,498	185,146	19
Florida	938,877	47,059	20
Oklahoma	2,377,629	120,300	20
Rhode Is.	637,415	30,595	21
New Hamp.	446,352	20,458	21
Massa.	3,832,790	176,564	22
New York	10,646,689	453,588	23
New Jersey	3,080,371	129,011	24
Penna.	8,798,067	370,110	24
New Mexico	437,015	16,893	26
Georgia	2,935,617	99,160	30
So. Carolina	1,660,934	55,400	30
Virginia	2,234,030	72,228	30
No. Carolina	2,466,025	72,300	34
Kentucky	2,408,547	65,884	36
Tennessee	2,321,253	61,500	38
W. Virginia	1,439,165	37,025	39
Arkansas	1,719,965	41,458	41
Louisiana	1,884,778	39,355	48
Mississippi	2,001,466	40,000	50
Alabama	2,395,270	46,155	52
Total	105,186,167	5,945,442	
Average for United States.			18

Vehicles Per Capita for Seven Years

State	1910 Census 1912	1913	1914	Est. 1916 Census 1915	1916	Est. 1917 Census 1917	Est. 1918 Census 1918
Alabama	631	393	254	168	104	72	52
Arizona	126	59	43	34	19	13	12
Arkansas	700	524	279	215	118	61	41
California	27	40	19	18	14	12	11
Colorado	89	61	44	36	22	15	14
Connecticut	62	48	42	32	22	17	15
Delaware	112	85	70	43	28	22	18
District of Columbia	28	21	41	35	28	17	9
Florida	112	90	73	67	63	23	20
Georgia	136	141	125	117	62	41	30
Idaho	130	150	100	59	33	18	14
Illinois	83	69	43	33	25	18	17
Indiana	50	60	41	29	20	15	13
Iowa	47	32	21	16	13	8	7
Kansas	77	49	33	24	16	12	10
Kentucky	445	318	195	121	76	51	36
Louisiana	237	230	473	167	108	57	48
Maine	96	70	52	41	27	20	19
Maryland	123	91	64	49	41	24	18
Massachusetts	66	55	44	41	27	24	22
Michigan	71	52	37	26	19	14	12
Minnesota	72	55	31	25	17	12	12
Mississippi	620	600	461	168	95	62	50
Missouri	135	86	65	44	32	23	19
Montana	188	67	35	31	19	11	10
Nebraska	35	25	24	21	13	9	7
Nevada	91	72	55	48	23	16	14
New Hampshire	75	58	49	41	31	24	21
New Jersey	72	65	43	43	39	34	24
New Mexico	359	190	106	82	50	30	26
New York	86	75	58	48	37	26	23
North Carolina	357	222	149	113	68	44	34
North Dakota	64	44	33	29	18	12	11
Ohio	75	55	39	28	20	16	13
Oklahoma	253	209	225	83	42	23	20
Oregon	66	48	41	35	27	18	13
Pennsylvania	129	101	65	56	37	27	24
Rhode Island	72	55	44	37	29	25	21
South Carolina	151	132	101	111	86	45	30
South Dakota	40	40	29	23	16	11	9
Tennessee	219	155	111	84	73	48	38
Texas	111	72	60	49	22	21	18
Utah	145	93	61	54	32	21	17
Vermont	85	66	47	32	26	20	18
Virginia	358	228	148	102	62	40	30
Washington	82	47	38	41	25	17	14
West Virginia	227	240	169	103	68	45	39
Wisconsin	95	67	44	31	21	15	13
Wyoming	63	92	60	45	45	15	12

Increase in Registration Dec. 31, 1917 to Dec. 1, 1918

	Increase	Per Cent
District of Columbia	18,847	89
South Carolina	18,578	50
New Jersey	41,590	48
Arkansas	12,596	44
Georgia	28,664	41
Alabama	13,282	40
Maryland	22,017	39
Kentucky	18,484	39
Oregon	18,475	38
Wyoming	4,149	35
Idaho	7,609	31
Virginia	16,567	30
North Carolina	16,350	29
Washington	26,083	28
Utah	5,978	28
Missouri	39,004	27
Tennessee	13,000	27
Mississippi	8,350	26
Ohio	83,770	25
South Dakota	16,845	25
Delaware	2,411	25
Louisiana	7,705	24
Rhode Island	5,453	22
Michigan	46,166	21
Indiana	37,727	20
Kansas	31,667	20
Oklahoma	20,101	20
Wisconsin	32,313	20
New Mexico	2,817	20
Montana	8,229	20
Florida	7,843	20
California	45,057	18
Nevada	1,227	18
Nebraska	27,269	18
Iowa	49,287	18
West Virginia	5,719	18
Texas	36,749	17
Illinois	48,843	14
Pennsylvania	44,957	14
Massachusetts	21,520	14
Connecticut	10,260	14
Arizona	2,781	14
New York	49,341	13
New Hampshire	2,312	13
North Dakota	7,538	12
Vermont	2,214	12
Maine	3,655	10
Minnesota	9,627	5
Colorado	3,150	5
Total	1,004,176	
Average for United States		20%

The New England states, which a year ago showed a very small increase compared with other centers, this year show a substantial gain. Here are the figures:

State	1917	1918
Maine	38,499	42,154
Vermont	18,146	20,458
Massachusetts	155,044	176,564
Rhode Island	25,142	30,595
Connecticut	74,642	84,902
Total	311,473	354,673

Iowa and Nebraska, as might be expected from the records of previous years, head the list insofar as per capita distribution of cars and trucks is concerned. In each of these states, the entire population can be carried in their vehicles. Each has one motor vehicle for every seven persons. Last year, Iowa had one for every 8 persons and Nebraska one for every 9 persons.

(*Continued on page* 198)

This map will give some idea of where the big gains in registration were made. Each dot represents 1000 *vehicles gained over the previous year*

Record of Performance of American Planes

This Table Serves to Illustrate the Numerous Types of Airplanes Built by the U. S. Government Since June, 1917—At One Period Nearly 60,000 Employees Were Engaged in the Work in Various Factories

Type	No. Seats	Engine	Altitude (Ft.)	Climb Time	Rate, Ft. per Min.	R.P.M.	Speed	R.P.M.	Service Ceiling at 100 Ft. per Min.	Weight Empty, Lb.	Military Load, Lb.	Fuel and Oil Load, Lb.	Total Load, Lb.	Endurance at 6500 Ft.	Gas Consumption, Lbs. per Hour	Oil Consumption, Lbs. per Hour	Theoretical Ceiling, Ft.
				M. S.													
Ordnance Engineering Scout	1	80 Le Rhone	0	....	....	....	98	1180	13,500	835	282	..	1,117	.....	..	..	....
			6,500	9	535	1140	94	1175	....	....	..	..	....	.....	..	..	....
			10,000	17 30	315	1100	84	1175	....	....	..	..	....	.....	..	..	....
			15,000	55	....	1100	70	1100	....	....	..	..	....	.....	..	..	....
Bristol Scout	..	80 Le Rhone	0	11 45	400	1260	88.3	....	13,000	789	286	..	1,075	.....	..	..	....
			6,500	23 26	240	1215	83	....	....	....	..	..	....	.....	..	..	....
			10,000	....	....	....	75	....	....	....	..	..	....	.....	..	..	....
Lepere	..	Liberty 12	0	....	....	1500	136	1800	20,800	....	..	..	....	.....	..	..	22,000
			6,000	5 35	....	1540	132	1740	....	....	..	..	....	.....	..	..	....
			10,000	10 35	....	1520	127	1680	....	....	..	..	....	.....	..	..	....
			15,000	19 15	....	1500	118	1620	....	....	..	..	....	.....	..	..	....
			20,000	41	....	1480	102	1550	....	....	..	..	....	.....	..	..	....
S. E. 5 (British)	..	180 Hispano-Suiza	0	....	1170	....	123.0	2100	19,400	....	..	..	2,051	.....	..	..	....
			6,500	6 50	810	1800	118.5	2080	....	....	..	..	....	.....	..	..	....
			10,000	11 34	615	1800	115.5	2000	....	....	..	..	....	.....	..	..	....
			15,000	21 20	340	1800	107.5	1965	....	....	..	..	....	.....	..	..	....
			20,000	50 17	60	1780	85.0	1820	....	....	..	..	....	.....	..	..	....
S. E. 5 (American)	..	180 Hispano-Suiza	0	....	....	....	121.6	2100	20,400	....	..	..	2,060	.....	..	..	....
			6,500	8	750	1800	120.0	2140	....	....	..	..	....	.....	..	..	....
			10,000	13	590	1800	117.0	2080	....	....	..	..	....	.....	..	..	....
			15,000	22 10	350	1800	109.0	2000	....	....	..	..	....	.....	..	..	....
			20,000	50 30	140	1790	92.5	1860	....	....	..	..	....	.....	..	..	....
Standard E-1 or M-Defense	..	80 Le Rhone	0	....	....	....	99.8	1240	....	828	01	115	1,144	.....	48	7.5	14,800
			6,000	10	....	1180	....	....	....	....	..	..	....	.....	..	..	....
			6,500	....	....	....	94.0	1240	....	....	..	..	....	.....	..	..	....
			10,000	22 20	....	1180	85.0	1220	....	....	..	..	....	.....	..	..	....
V. S. B-1 (British Fighter)	..	300 Hispano-Suiza	0	....	....	114.5	1760	....	....	....	..	..	....	.....	..	..	....
			6,500	5 35	1600	113.6	1700	....	....	1842	742	344	2,910	.....	155	8	25,000
			10,000	10 45	1600	109.5	1660	....	....	....	..	..	....	.....	..	..	....
			15,000	19 30	1600	101.0	1600	....	....	....	..	..	....	.....	..	..	....
DeHaviland 4	..	Liberty 12	0	....	....	....	124.7	....	19,500	2391	1191	..	3,582	Full time, 2' 12"	..	..	....
			6,500	....	....	....	120.0	....	....	....	..	..	....		..	..	....
	..		10,000	14 5	....	....	117.0	....	....	....	..	..	....	Half throttle	..	..	....
			15,000	....	....	....	113.0	....	....	....	..	..	....	3'3"	..	..	....
Handley Page 0-400	..	2 Liberty 12's	0	....	....	....	97.0	....	14,000	....	..	..	11,270	.....	..	..	....
			7,000	....	....	....	18.10	....	....	....	..	..	....	.....	..	..	....
			10,000	....	....	....	29.0	....	....	....	..	..	....	.....	..	..	....
V. E. 7	..	150 or 180 Hispano-Suiza	0	....	....	....	106	1730	17,500	1392	545	..	1,937	.....	..	..	....
			6,500	8 50	635	1970	103	1700	....	....	..	..	....	.....	..	..	....
			10,000	15 15	462	1480	97	1650	....	....	..	..	....	.....	..	..	....
			15,000	29	220	1480	86	1600	....	....	..	..	....	.....	..	..	....
DeHaviland 9	2	400 Liberty	0	....	....	....	116	....	17,000	....	..	..	....	4'00"	..	..	....
			10,000	9	....	....	109	....	....	....	..	..	....	.....	..	..	....
Handley Page-V	to 11	4-375 h.p. Eagle VIII Rolls-Royce	0	17	....	....	110	....	13,000	....	..	..	....	15'00"	..	..	....
			10,000	....	....	....	98	....	....	....	..	..	....	.....	..	..	....
JN-4-D	..	Curtiss OX5 90 h.p.	0	....	....	....	75	....	....	1920	..	..	....	.....	..	..	....
			10,000	....	....	....	....	....	....	....	..	..	....	.....	..	..	....
JN-6-H	..	Hispano-Suiza 150 h.p.	0	....	....	....	105	....	....	2145	..	..	....	.....	..	..	....
			10,000	....	....	....	....	....	....	....	..	..	....	.....	..	..	....

OF the airplanes enumerated in the above table of performances, the following numbers have been actually produced and delivered into service either overseas or to flying fields in the U. S. In all, 517 De Haviland 4 machines have been completed at an estimated cost of $6,512 each, 2960 JN-4-D machines costing $4,646 each and 24 Bristols, costing $6,750 each.

Other JN planes, designated as type H, for training, gunnery and bombing purposes were shipped. Of these, 402 were training planes, 312 were for gunnery use and 100 were bombing planes. The cost of these is estimated at $4,750 each. Another type, known as SJ-4, not included in the table of performances, was produced in quantities at an estimated cost of $4,500 each. No less than 1600 of these were shipped.

Production commenced in June, 1917, with a total of 147 JN-4-D machines; from then on the rate increased rapidly and in January, 1918, a total production of 729 planes was reached. Production was maintained through the following months and during the summer a number of Penguin planes were built at a cost of $2,025 each.

Exports of Passenger Automobiles

(*Figures are for Fiscal*

	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	Totals by Countries
Europe:													
	8	*4*	*22*	*25*	*36*	*100*	*134*	*314*	*4*	.....	.....	.....	*647*
Austria-Hungary	$16,611	$3,218	$36,978	$26,178	$27,911	$78,748	$91,781	$190,199	$2,310	.....	.....	.....	$473,934
	....	.....	.....	*2*	*1*	*13*	*16*	*20*	*18*	*6*	*1*	.....	*77*
Azores & Madeira Is.	....	.....	.....	$2,006	$1,265	$7,866	$10,549	$10,771	$10,119	$2,272	$700	.....	$45,548
	35	*14*	*14*	*58*	*133*	*122*	*94*	*244*	*12*	.....	.....	.....	*726*
Belgium	$58,859	$36,900	$46,340	$147,375	$241,269	$140,585	$85,679	$139,681	$15,191	.....	.....	.....	$911,879
	....	.....	.....	*2*	*9*	*28*	*17*	*43*	.....	.....	.....	.....	*99*
Bulgaria	....	.....	.....	$1,890	$6,530	$19,716	$11,457	$21,679	.....	.....	.....	.....	$61,272
	40	*10*	*50*	*46*	*52*	*51*	*81*	*263*	*219*	*806*	*1,215*	*2*	*2,835*
Denmark	$30,464	$9,045	$29,967	$46,024	$10,021	$41,976	$77,149	$176,917	$156,296	$548,971	$932,768	$1,100	$2,093,728
	....	.....	.....	.....	*14*	*24*	*51*	*106*	*17*	.....	.....	.....	*212*
Finland	.....	.....	.....	.....	$12,049	$26,203	$53,568	$83,835	$9,163	.....	.....	.....	$185,718
	111	*191*	*201*	*246*	*310*	*574*	*818*	*1,427*	*451*	*2,987*	*1,337*	*1,169*	*8,952*
France	$489,047	$669,405	$643,692	$771,869	$473,122	$469,721	$615,086	$919,060	$252,909	$1,428,325	$836,557	$1,518,858	$9,087,651
	66	*68*	*45*	*100*	*99*	*288*	*845*	*1,411*	*16*	.....	.....	.....	*2,938*
Germany	$141,371	$171,293	$136,966	$265,218	$209,663	$226,227	$764,389	$1,040,787	$17,364	.....	.....	.....	$2,973,278
	1	.....	*1*	.....	*2*	*1*	*7*	*64*	*9*	*15*	*9*	.....	*109*
Gilbraltar	$2,500	.....	$683	.....	$9,530	$1,673	$6,576	$33,030	$6,077	$16,165	$11,518	.....	$87,752
	....	.....	.....	.....	*5*	*14*	*5*	*25*	*36*	*124*	*78*	*4*	*291*
Greece	.....	.....	.....	.....	$3,871	$9,355	$4,080	$28,256	$28,431	$118,398	$79,913	$6,580	$278,884
	.....	.....	.....	.....	.....	.....	*2*	*5*	*3*	.....	*11*	*15*	*36*
Iceland and Faroe Is.	.....	.....	.....	.....	.....	.....	$1,016	$2,488	$2,128	.....	$5,134	$11,396	$22,162
	93	*73*	*62*	*93*	*136*	*211*	*331*	*342*	*114*	*382*	*186*	*129*	*2,152*
Italy	$249,192	$243,744	$240,516	$333,193	$188,405	$193,037	$280,961	$241,466	$70,265	$217,240	$126,432	$78,228	$2,462,679
	....	.....	.....	.....	.....	*1*	*1*		.....	.....	.....	.....	*2*
Malta, Gozo & Cyprus Islands	.....	.....	.....	.....	.....	$500	.....	$422	.....	.....	.....	.....	$922
	19	*19*	*21*	*33*	*20*	*103*	*111*	*141*	*96*	*439*	*485*	.....	*1,487*
Netherlands	$49,146	$43,699	$53,935	$76,957	$50,796	$78,363	$94,163	$117,131	$131,801	$399,017	$612,495	.....	$1,707,533
	1	*3*	*11*	*22*	*13*	*78*	*78*	*145*	*125*	*732*	*922*	*97*	*2,227*
Norway	$330	$5,751	$8,079	$20,669	$13,808	$66,897	$66,689	$118,338	$89,357	$592,560	$944,002	$115,810	$2,042,290
	.....	*1*	*4*	*9*	*23*	*15*	*73*	*59*	*14*	*204*	*283*	*223*	*908*
Portugal	.....	$1,226	$3,041	$11,429	$23,966	$14,752	$58,931	$65,545	$18,255	$198,975	$271,421	$270,987	$938,528
	.....	*3*	.....	.....	*46*	*31*	*38*	*28*	.....	*2*	.....	.....	*148*
Roumania	.....	$4,941	.....	.....	$31,806	$22,543	$30,337	$17,018	.....	$3,000	.....	.....	$108,925
	32	*32*	*71*	*97*	*147*	*261*	*580*	*926*	*907*	*1,268*	*780*	*492*	*5,593*
Russia in Europe	$27,638	$37,243	$78,409	$107,310	$139,487	$254,047	$484,913	$898,458	$1,527,768	$3,142,616	$943,003	$1,136,400	$8,777,292
	....	.....	.....	.....	*1*	*4*	*2*	*4*	*2*	*3*	.....	.....	*16*
Serbia, Montenegro & Albania	.....	.....	.....	.....	$652	$2,520	$1,160	$2,843	$2,950	$4,200	.....	.....	$14,325
	10	*5*	*9*	*12*	*63*	*174*	*186*	*83*	*71*	*364*	*1,125*	*1,305*	*3,307*
Spain	$10,640	$3,855	$9,061	$18,330	$54,599	$116,202	$127,621	$64,758	$59,555	$299,367	$1,195,887	$1,346,826	$3,306,701
	53	*16*	*18*	*45*	*68*	*169*	*250*	*324*	*137*	*238*	*390*	*95*	*1,809*
Sweden	$63,051	$20,409	$44,585	$55,115	$62,005	$127,729	$235,918	$253,588	$108,652	$160,869	$360,554	$111,377	$1,623,855
	1	*1*	*5*	.....	*8*	*12*	*22*	*79*	*2*	*6*	*9*	*3*	*148*
Switzerland	$750	$608	$5,792	.....	$5,104	$7,873	$24,965	$56,838	$1,244	$4,499	$9,248	$1,533	$118,454
	1	*1*	.....	.....	*11*	*22*	*13*	*35*	.....	.....	.....	.....	*83*
Turkey in Europe	$2,000	$807	.....	.....	$8,929	$13,886	$9,814	$21,052	.....	.....	.....	.....	$56,488
			590	*1,258*	*2,222*	*5,660*	*3,783*	*6,992*	*8,321*	*9,810*	*1,268*	*742*	*40,646*
England			$1,673,914	$2,391,984	$2,233,734	$4,403,361	$2,893,785	$5,615,487	$6,849,145	$6,933,806	$1,444,346	$1,712,672	$36,152,234
	739	*757*	*3*	*12*	*13*	*22*	*6*	*25*	*143*	*158*	*4*	*150*	*536*
Scotland	$1,414,056	$1,621,516	$6,240	$18,109	$22,638	$28,901	$8,104	$46,948	$82,708	$124,138	$2,991	$217,000	$557,777
			.....	*1*	*14*	*34*	*6*	*2*	*159*	*60*	.....	.....	*1,772*
Ireland			.....	$5,500	$16,850	$22,186	$5,538	$1,593	$157,091	$55,014	.....	.....	*$3,299,344
North America:													
	....	*1*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*1*
Bermuda	....	$1,800	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	$1,800
	3	.....	.....	.....	*1*	.....	*1*	*4*	*1*	.....	*12*	*8*	*30*
British Honduras	$4,020	.....	.....	.....	$2,500	.....	$1,800	$3,929	$550	.....	$5,774	$6,858	$25,431
	611	*385*	*1,230*	*3,102*	*4,687*	*6,288*	*6,783*	*4,377*	*4,127*	*10,017*	*14,421*	*12,985*	*68,953*
Canada	$969,385	$700,504	$1,457,129	$3,340,326	$5,047,927	$7,560,655	$8,229,324	$5,445,052	$3,723,125	$6,555,334	$11,143,740	$10,189,865	$64,362,366
Central American States:													
	....	*2*	*5*	*2*	*12*	*13*	*13*	*30*	*9*	*60*	*37*	*199*	*372*
Costa Rica	....	$1,336	$3,115	$1,823	$12,698	$12,603	$14,955	$17,877	$3,897	$28,325	$23,125	$85,070	$204,824
	4	*6*	*11*	*16*	*28*	*19*	*10*	*26*	*10*	*24*	*35*	*34*	*223*
Guatemala	$2,743	$11,550	$11,597	$22,094	$34,054	$38,109	$14,892	$36,763	$12,012	$23,552	$36,174	$46,657	$290,197
	....	.....	*2*	.....	.....	*3*	*4*	*4*	*31*	*34*	*42*	*16*	*136*
Honduras	....	.....	$492	.....	.....	$7,114	$8,100	$3,286	$20,422	$22,652	$24,564	$12,292	$98,922
	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*49*	*52*
Nicaragua	$2,050	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	$32,031	$34,081
	2	*7*	*2*	*13*	*21*	*20*	*39*	*58*	*110*	*228*	*355*	*129*	*985*
Panama	$1,170	$4,926	$850	$13,289	$27,415	$14,271	$13,432	$51,906	$85,990	$170,964	$216,711	$93,329	$724,253
	....	*1*	*2*	*3*	*5*	*6*	*11*	*10*	*16*	*68*	*75*	*54*	*251*
Salvador	....	$1,700	$1,410	$5,565	$22,199	$10,658	$13,212	$13,323	$8,888	$54,598	$62,314	$68,297	$262,161
	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Greenland	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	465	*244*	*200*	*245*	*350*	*273*	*235*	*155*	*70*	*383*	*2,807*	*2,578*	*8,005*
Mexico	$681,086	$354,338	$282,462	$459,077	$614,160	$418,599	$423,123	$239,166	$66,830	$309,200	$1,642,011	$1,653,545	$7,143,597
Miquelon, Langley & St. Pierre Islands	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Newfoundland & Labrador	*3*	*2*	*6*	*15*	*10*	*14*	*9*	*5*	*17*	*21*	*48*	*27*	*17*
	$9,828	$6,500	$4,907	$18,285	$10,412	$13,812	$10,353	$2,761	$11,681	$15,632	$38,910	$34,676	$177,757
West Indies, British:													
					22	*16*	*7*	*14*	*19*	*63*	*121*	*58*	*320*
Barbados					$22,531	$11,310	$5,973	$12,320	$8,699	$30,688	$62,364	$33,198	$187,083
					58	*53*	*62*	*66*	*80*	*273*	*335*	*236*	*1,163*
Jamaica					$81,368	$52,659	$59,131	$61,475	$61,622	$205,239	$202,375	$149,673	$873,542
	35	*28*	*42*	*102*	*7*	*31*	*43*	*47*	*59*	*128*	*204*	*161*	*680*
Trinidad & Tobago	$56,059	$45,866	$77,164	$157,459	$7,325	$31,343	$39,902	$49,079	$40,281	$87,167	$112,014	$100,571	$467,682
					4	*4*	*7*	*13*	*38*	*100*	*124*	*80*	*577*
Other British					$5,900	$1,960	$6,716	$11,061	$18,463	$51,612	$80,879	$50,009	$563,148*
	67	*105*	*74*	*120*	*157*	*202*	*223*	*297*	*1,359*	*3,698*	*3,529*	*2,846*	*12,677*
Cuba	$129,226	$157,081	$140,160	$187,392	$208,960	$234,569	$242,686	$254,428	$745,695	$2,091,295	$2,545,071	$3,029,813	$9,966,376
	....	.....	.....	.....	*1*	*5*	*4*	*3*	*3*	*9*	*18*	*152*	*195*
Danish (Virgin Is. of U. S.)	.....	.....	.....	.....	$723	$3,303	$2,131	$2,954	$1,375	$3,426	$9,114	$12,313	$35,339
	1	*1*	*2*	*1*	*22*	*13*	*7*	*11*	*28*	*131*	*191*	*248*	*656*
Dominican Republic	$1,650	$2,000	$2,820	$4,000	$18,591	$12,739	$5,382	$15,195	$14,609	$60,127	$96,173	$157,607	$390,893
	....	.....	.....	.....	*2*	*3*	*19*	*13*	*24*	*21*	*32*	*12*	*126*
Dutch	....	.....	.....	.....	$1,576	$1,647	$14,590	$9,605	$16,829	$10,945	$19,191	$7,435	$81,818
	....	.....	*1*	.....	.....	.....	*5*	*65*	*54*	*101*	*293*	*248*	*767*
French	....	.....	$1,000	.....	.....	.....	$3,877	$48,377	$34,906	$63,670	$154,990	$146,698	$453,518
	....	.....	.....	*1*	.....	*2*	*38*	*2*	.....	*10*	*29*	*102*	*184*
Haiti	....	.....	.....	$1,510	.....	$910	$24,499	$1,485	.....	$3,788	$13,780	$54,613	$100,585

*Includes England, Ireland and Scotland for 1907 and 1908.

For Years 1907 to 1918 Inclusive

Year ending June 30)

	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	Total by Countries
South America:													
	39	*70*	*109*	*268*	*343*	*727*	*1,062*	*940*	*626*	*4,399*	*3,924*	*3,525*	*16,032*
Argentina	$58,070	$72,396	$81,614	$174,677	$423,193	$860,350	$1,181,735	$963,586	$294,129	$2,065,439	$2,336,001	$2,666,898	$11,178,088
	2	.....	.....	.....	.....	.....	*2*	*4*	*10*	*26*	*141*	*152*	*337*
Bolivia	$1,550	.....	.....	.....	.....	.....	$1,493	$12,764	$5,462	$16,208	$100,151	$105,408	$243,036
	52	*55*	*24*	*64*	*181*	*554*	*987*	*299*	*81*	*272*	*873*	*1,575*	*5,017*
Brazil	$57,037	$97,363	$26,892	$67,687	$225,083	$662,883	$1,035,247	$264,992	$52,939	$157,968	$523,383	$1,000,011	$4,151,485
	44	*15*	*2*	*3*	*16*	*30*	*78*	*195*	*120*	*826*	*2,587*	*3,399*	*7,315*
Chile	$52,905	$20,045	$1,471	$1,824	$15,231	$39,873	$109,982	$160,194	$64,327	$530,211	$1,821,842	$3,576,511	$6,394,416
	.....	*1*	*1*	*12*	*14*	*42*	*110*	*79*	*39*	*91*	*173*	*164*	*726*
Colombia	.....	$500	$1,976	$22,482	$13,579	$35,386	$113,334	$69,620	$34,956	$58,525	$118,937	$121,422	$590,717
	.....	*4*	.....	*2*	*4*	*21*	*74*	*21*	*20*	*62*	*137*	*142*	*487*
Ecuador	.....	$2,453	.....	$2,168	$3,595	$20,578	$55,372	$21,229	$11,233	$44,396	$106,478	$130,085	$397,585
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Falkland Is	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	.....	*1*	*1*	*4*	*6*	*20*	*18*	*16*	*45*	*73*	*146*	*180*	*510*
Guiana, British	.....	$765	$823	$5,952	$4,700	$17,306	$114,313	$11,364	$24,311	$33,933	$65,989	$100,546	$280,002
Dutch	.....	.....	.....	.....	.....	.....	.....	*7*	*9*	*15*	*23*	*16*	*70*
	.....	.....	.....	.....	.....	.....	.....	$3,948	$4,492	$7,181	$11,797	$17,775	$45,193
French	.....	.....	.....	.....	.....	*1*	*1*	.....	.....	*1*	*1*	*8*	*12*
	.....	.....	.....	.....	.....	$580	$558	.....	.....	$1,000	$498	$3,632	$6,268
	5	*1*	.....	*1*	.....	.....	.....	.....	*5*	*6*	*40*	*13*	*71*
Paraguay	$2,394	$557	.....	$1,200	.....	.....	.....	.....	$2,308	$2,256	$20,192	$5,025	$33,932
	8	*8*	*2*	*4*	*4*	*13*	*70*	*36*	*24*	*59*	*400*	*784*	*1,412*
Peru	$6,428	$6,790	$4,403	$5,004	$2,950	$10,833	$55,646	$31,362	$20,658	$40,388	$295,558	$913,669	$1,393,689
	1	*8*	*4*	*20*	*96*	*177*	*209*	*183*	*45*	*285*	*1,165*	*2,232*	*4,425*
Uruguay	$625	$13,142	$5,657	$23,666	$147,142	$235,097	$273,253	$167,269	$25,706	$150,540	$612,838	$1,177,463	$2,832,398
	1	.....	.....	.....	.....	*26*	*104*	*126*	*227*	*518*	*542*	*160*	*1,704*
Venezuela	$1,000	.....	.....	.....	.....	$28,180	$109,499	$102,073	$143,086	$314,156	$327,507	$97,485	$1,122,986
Asia:													
	.....	.....	.....	.....	*1*	.....	*15*	*28*	*9*	*16*	*10*	*8*	*87*
Aden	.....	.....	.....	.....	$788	.....	$7,998	$20,990	$6,706	$9,166	$7,968	$6,879	$60,495
	16	*7*	*4*	*8*	*42*	*78*	*89*	*114*	*122*	*264*	*509*	*833*	*2,086*
China	$15,255	$7,471	$3,369	$13,785	$40,261	$98,730	$90,459	$143,619	$119,635	$191,932	$383,371	$818,659	$1,926,546
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*6*	*6*
China, British	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	$3,000	$3,000
China, French	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*20*	*2*	*22*
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	$9,325	$2,017	$11,342
China, Japanese	.....	.....	.....	*1*	.....	*1*	.....	.....	.....	.....	*33*	*10*	*45*
	.....	.....	.....	$5,100	.....	$850	.....	.....	.....	.....	$17,796	$7,321	$31,067
Chosen (Korea)	.....	.....	.....	*1*	*3*	.....	*7*	*2*	*2*	*7*	*5*	*2*	*29*
	.....	.....	.....	$10,270	$3,308	.....	$6,095	$1,795	$1,800	$4,780	$3,832	$1,300	$33,180
East Indies, British:													
	45	*11*	*7*	*26*	*150*	*253*	*439*	*437*	*315*	*2,289*	*3,603*	*73*	*7,648*
British India	$26,067	$9,970	$5,320	$22,372	$130,421	$203,740	$355,573	$379,954	$274,680	$1,638,262	$2,644,085	$53,428	$5,743,872
	9	*16*	*14*	*21*	*36*	*120*	*387*	*262*	*77*	*376*	*855*	*287*	*2,460*
Straits Settlements	$4,754	$12,625	$12,040	$20,955	$28,951	$86,668	$319,247	$216,659	$70,210	$239,715	$585,820	$202,221	$1,799,865
	.....	*2*	.....	*4*	*12*	*25*	*39*	*82*	*25*	*239*	*110*	*11*	*549*
Other British	.....	$1,375	.....	$2,875	$8,540	$20,882	$31,245	$73,175	$20,208	$168,685	$80,033	$17,740	$424,758
	67	*117*	*53*	*33*	*42*	*120*	*278*	*290*	*105*	*1,064*	*3,206*	*1,272*	*6,647*
Dutch	$36,629	$79,989	$40,836	$21,768	$34,252	$70,055	$198,378	$208,722	$87,306	$753,128	$2,642,330	$1,302,800	$5,476,193
	.....	.....	.....	.....	.....	.....	.....	.....	.....	*8*	*18*	*18*	*44*
French	.....	.....	.....	.....	.....	.....	.....	.....	.....	$3,033	$17,967	$21,175	$42,175
	9	*3*	*1*	*2*	*1*	*4*	*7*	*11*	*2*	*15*	*38*	*117*	*210*
Hongkong	$7,372	$2,308	$459	$3,788	$550	$2,740	$6,673	$13,043	$1,475	$10,858	$35,255	$91,22	$175,749
	15	*7*	*6*	*12*	*61*	*118*	*312*	*96*	*28*	*153*	*652*	*2,139*	*3,599*
Japan	$19,242	$17,230	$4,996	$26,759	$58,933	$143,610	$364,507	$100,995	$29,210	$120,061	$481,748	$2,040,897	$3,408,188
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*2*	*2*
Persia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	$1,048	$1,048
	2	.....	.....	*3*	.....	.....	*1*	*12*	*551*	*683*	*1,072*	*5*	*3,329*
Russia in Asia	$1,884	.....	.....	$1,760	.....	.....	$1,160	$14,998	$1,477,809	$529,385	$1,324,060	$8,425	$3,359,481
	4	*5*	.....	*4*	*6*	*13*	*56*	*37*	*13*	*41*	*31*	*65*	*276*
Siam	$1,569	$2,959	.....	$6,407	$6,540	$8,933	$35,934	$26,219	$10,317	$32,082	$15,915	$60,220	$207,095
	.....	.....	*3*	*1*	*1*	*1*	*1*	*7*	*1*	.....	.....	.....	*15*
Turkey in Asia	.....	.....	$7,900	$1,200	$652	$650	$824	$5,662	$1,000	.....	.....	.....	$17,888
Occania, British:													
	62	*87*	*127*	*437*	*1,046*	*2,597*	*2,083*	*3,099*	*2,169*	*5,335*	*5,055*	*4,307*	*26,404*
Australia	$57,731	$74,175	$81,426	$268,274	$874,112	$2,260,320	$1,896,990	$2,615,896	$1,768,479	$4,147,302	$3,792,571	$3,410,557	$21,247,833
	69	*59*	*60*	*77*	*413*	*953*	*958*	*1,065*	*938*	*2,672*	*3,554*	*1,818*	*12,636*
New Zealand	$120,533	$72,647	$41,826	$55,236	$383,449	$946,736	$990,837	$974,708	$784,206	$2,055,843	$2,558,118	$1,453,311	$10,437,450
	.....	.....	.....	.....	*18*	*75*	*3*	*9*	*2*	*28*	*19*	*30*	*184*
Other British	.....	.....	.....	.....	$24,414	$73,932	$2,396	$6,014	$2,081	$18,227	$11,062	$20,863	*$158,989
	.....	.....	.....	*1*	.....	*3*	*11*	*46*	*8*	*92*	*22*	*12*	*195*
French	.....	.....	.....	$900	.....	$2,920	$14,005	$45,184	$7,482	$56,789	$12,330	$7,612	$147,222
	.....	.....	.....	.....	.....	.....	*1*	.....	*1*	*7*	*12*	*12*	*33*
German	.....	.....	.....	.....	.....	.....	$350	.....	$5,000	$3,208	$5,847	$11,029	$25,43
	2	*16*	*24*	*130*	*309*	*401*	*517*	*614*	*407*	*861*	*1,019*	*1,714*	*6,014*
Philippine Islands	$1,205	$14,897	$27,410	$175,626	$382,551	$557,368	$577,040	$697,175	$425,001	$859,450	$686,731	$1,373,204	$5,777,658
	.....	.....	.....	.....	.....	.....	*4*	*32*	*42*	*63*	*240*	*202*	*583*
British Africa West	.....	.....	.....	.....	.....	.....	$2,688	$18,319	$20,899	$35,361	$144,838	$115,772	$337,877
	2	*2*	*26*	*75*	*135*	*331*	*1,279*	*1,618*	*695*	*2,859*	*3,423*	*2,142*	*12,587*
South	$1,817	$1,147	$22,152	$61,185	$126,734	$306,606	$1,157,895	$1,437,883	$731,278	$2,040,977	$2,378,380	$1,706,136	$9,972,190
	.....	.....	*5*	*11*	*2*	*22*	*14*	*49*	*120*	*257*	*94*	*112*	*666*
East	.....	.....	$4,402	$10,463	$2,511	$14,998	$12,802	$34,430	$75,188	$137,245	$55,681	$75,778	$423,498
	.....	*1*	*2*	*1*	.....	*3*	*10*	*15*	*27*	*51*	*31*	*15*	*155*
Canary Islands	.....	$1,426	$1,804	$850	.....	$2,066	$6,426	$6,956	$12,015	$32,935	$24,525	$5,378	$94,381
	2	*1*	*1*	*1*	*4*	*5*	*16*	*22*	*1*	*25*	*38*	*21*	*137*
Egypt	$887	$3,500	$1,300	$998	$10,097	$2,872	$10,156	$11,437	$695	$18,352	$22,113	$17,300	$99,709
	1	.....	*4*	*11*	*21*	*30*	*10*	*19*	.....	*2*	*41*	*121*	*260*
French Africa	$950	.....	$7,611	$18,188	$14,214	$20,164	$7,297	$17,273	.....	$1,155	$13,315	$50,550	$150,717
	.....	.....	.....	.....	.....	.....	*5*	*19*	*7*	*20*	.....	.....	*51*
German Africa	.....	.....	.....	.....	.....	.....	$3,175	$14,136	$4,865	$7,760	.....	.....	$29,936
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*3*	.....	*3*
Italian Africa	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	$1,200	.....	$1,200
	.....	.....	.....	.....	.....	.....	*1*	.....	.....	.....	*1*	*12*	*14*
Liberia	.....	.....	.....	.....	.....	.....	$805	.....	.....	.....	$975	$4,220	$6,000
	.....	.....	.....	.....	.....	.....	.....	.....	.....	*7*	*1*	*2*	*10*
Madagascar	.....	.....	.....	.....	.....	.....	.....	.....	.....	$2,532	$808	$1,659	$4,999
	.....	.....	.....	.....	.....	.....	.....	*63*	*25*	*52*	*87*	*35*	*262*
Morocco	.....	.....	.....	.....	.....	.....	.....	$29,497	$10,847	$20,574	$39,670	$17,718	$118,306
	1	.....	.....	*7*	*3*	*16*	*20*	*24*	*6*	*56*	*7*	*9*	*149*
Portuguese Africa	$2,110	.....	.....	$5,302	$2,669	$13,096	$16,102	$21,563	$7,301	$38,510	$5,429	$9,673	$121,755
Totals	*2,862*	*2,477*	*3,184*	*6,926*	*11,803*	*21,757*	*24,293*	*28,306*	*23,880*	*56,234*	*64,808*	*52,312*	*298,842*
	$4,890,886	$4,656,991	$5,387,021	$9,548,700	$12,965,049	$21,550,139	$24,275,793	$25,392,963	$21,113,953	$40,660,263	$48,612,632	$45,331,360	$264,385,750

*Includes Barbados, Jamaica, Trinidad and Tobago, Other British for 1907, 1908, 1909 and 1910.

Imports of Passenger Cars for 11 Years

American Purchases of Foreign Automobiles Have Steadily Declined as Domestic Production Increased

	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	Totals by Countries
Austria-Hungary	.....	.....	*1*	.....	*4*	*14*	*4*	*1*	.....	.....	.....	*24*
	.....	.....	624	.....	$9,591	$30,102	$8,294	$2,233	.....	.....	.....	$50,844
Belgium	*4*	*3*	*12*	*13*	*32*	*56*	*9*	.....	.....	.....	.....	*128*
	$8,537	$7,080	$29,087	$26,180	$59,941	$144,693	$19,582	.....	.....	.....	.....	$295,100
France	*798*	*1,009*	*782*	*577*	*401*	*357*	*134*	*62*	*49*	*11*	.....	*3,975*
	$1,775,589	$1,838,653	$1,467,646	$797,931	$964,635	$814,392	$304,716	$131,936	$115,643	$29,497	.....	$8,240,638
Germany	*32*	*64*	*150*	*137*	*116*	*99*	*21*	*6*	.....	.....	.....	*625*
	$124,747	$193,580	$368,219	$297,153	$250,313	$261,168	$45,680	$13,606	.....	.....	.....	$1,554,466
Italy	*132*	*328*	*352*	*130*	*131*	*116*	*55*	*111*	*1*	*1*	*1*	*1,358*
	$331,363	$561,620	$587,052	$239,079	$200,530	$205,931	$79,464	$122,446	$1,023	$1,100	$1,280	$2,330,888
Netherlands	.....	.....	*3*	*2*	.....	*1*	*1*	*6*	*6*	*1*	.....	*20*
	.....	.....	$6,652	$2,573	.....	$500	$1,136	$11,245	$8,880	$1,600	.....	$32,586
Spain	.....	*1*	.....	.....	.....	.....	.....	*2*	*1*	.....	.....	*4*
	.....	$1,471	.....	.....	.....	.....	.....	$6,592	$2,637	.....	.....	$10,700
Sweden	.....	.....	.....	.....	.....	*1*	*1*	.....	.....	.....	.....	*2*
	.....	.....	.....	.....	.....	$3,944	$3,175	.....	.....	.....	.....	$7,119
Switzerland	*2*	*17*	*28*	*55*	*14*	*2*	*1*	.....	.....	.....	.....	*119*
	$5,665	$46,062	$60,554	$118,474	$32,125	$3,103	$1,190	.....	.....	.....	.....	$267,182
England	.....	*78*	*101*	*128*	*187*	*78*	*40*	*73*	*36*	*57*	*13*	*856*
	.....	$203,604	$236,015	$297,382	$431,066	$218,932	$115,042	$178,065	$80,615	$137,119	$29,658	$2,126,875
Scotland	*65**	*22*	.....	.....	*1*	.....	.....	*1*	.....	*1*	.....	*25*
	$199,377*	$22,446	.....	.....	$2,570	.....	.....	$1,700	.....	$350	.....	$27,066
Ireland	.....	.....	.....	.....	.....	.....	.....	.....	*1*	.....	.....	*1*
	.....	.....	.....	.....	.....	.....	.....	.....	$803	.....	.....	$803
Canada	*13*	*9*	*36*	*38*	*75*	*19*	*25*	*42*	*1,350*	*31*	*35*	*1,673*
	$40,720	$21,475	$69,737	$98,019	$171,366	$32,815	$29,940	$35,143	$579,168	$18,114	$21,240	$1,117,737
Mexico	.....	.....	*3*	*2*	*1*	.....	.....	*11*	*28*	*3*	.....	*48*
	.....	.....	$12,500	$5,000	$1,544	.....	.....	$8,425	$8,392	$500	.....	$36,361
Newfoundland and Labrador	.....	.....	.....	.....	.....	*2*	.....	.....	.....	.....	.....	*2*
	.....	.....	.....	.....	.....	$2,800	.....	.....	.....	.....	.....	$2,800
Cuba	*4*	*3*	*3*	*6*	.....	*3*	*4*	*4*	*1*	.....	*1*	*29*
	$14,316	$9,400	$8,575	$16,302	.....	$11,000	$4,100	$11,000	$3,500	.....	$400	$78,593
Argentina	.....	.....	.....	.....	.....	.....	.....	*1*	.....	.....	.....	*1*
	.....	.....	.....	.....	.....	.....	.....	$1,925	.....	.....	.....	$1,925
Japan	.....	.....	.....	.....	.....	.....	*1*	.....	.....	.....	.....	*1*
	.....	.....	.....	.....	.....	.....	$1,282	.....	.....	.....	.....	$1,282
Australia	.....	.....	.....	.....	.....	.....	*1*	*2*	.....	.....	.....	*3*
	.....	.....	.....	.....	.....	.....	$1,703	$987	.....	.....	.....	$2,690
New Zealand	.....	.....	.....	.....	.....	.....	.....	.....	*1*	.....	.....	*1*
	.....	.....	.....	.....	.....	.....	.....	.....	$1,250	.....	.....	$1,250
Philippine Islands	.....	.....	.....	.....	.....	.....	*3*	.....	.....	.....	.....	*3*
	.....	.....	.....	.....	.....	.....	$5,180	.....	.....	.....	.....	$5,180
Russia	.....	.....	.....	*1*	.....	.....	.....	.....	.....	.....	.....	*1*
	.....	.....	.....	$750	.....	.....	.....	.....	.....	.....	.....	$750
Panama	.....	.....	.....	.....	*1*	.....	.....	.....	.....	.....	.....	*1*
	.....	.....	.....	.....	$1,500	.....	.....	.....	.....	.....	.....	$1,500
British West Indies	.....	.....	*1*	.....	.....	.....	.....	.....	.....	.....	.....	*1*
	.....	.....	$2,500	.....	.....	.....	.....	.....	.....	.....	.....	$2,500
China	.....	.....	*1*	.....	.....	.....	.....	.....	.....	.....	.....	*1*
	.....	.....	$2,285	.....	.....	.....	.....	.....	.....	.....	.....	$2,285
Totals	*1,045*	*1,624*	*1,473*	*888*	*963*	*748*	*300*	*322*	*1,474*	*105*	*50*	*8,998*
	$2,500,314	$2,905,391	$2,851,446	$1,898,843	$2,134,181	$1,759,380	$620,493	$525,303	$801,911	$188,280	$52,578	$16,238,12

*Included with totals for England.

Exports of Automotive Parts for 12 Years

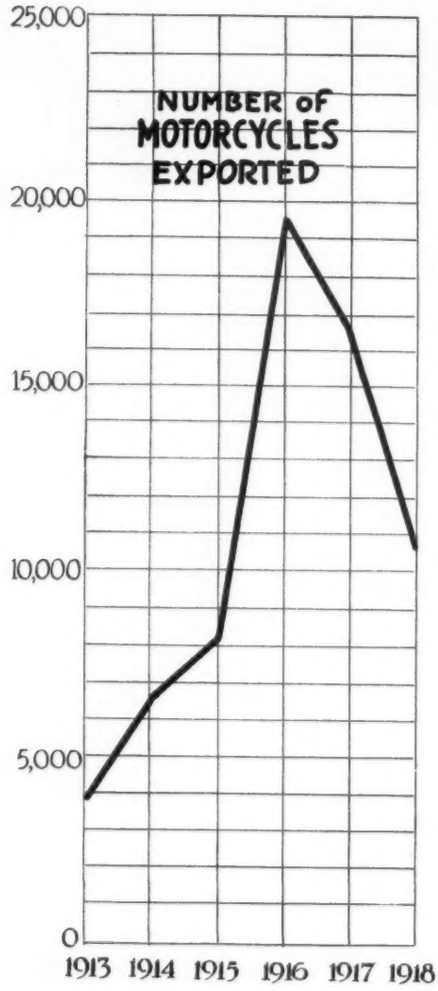
From Slightly More Than Half a Million Dollars, Export of Parts Have Increased to $32,933,006 in 1918

Not Including Engines and Tires

	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	Totals by Countries
Europe:													
Austria-Hungary	$717	$1,087	$669	$2,511	$1,412	$2,195	$4,572	$5,198	$1,045	....	....	....	$19,406
Azores and Madeira Is.	....	10	....	50	67	99	720	1,384	1,800	$1,532	$1,270	$198	7,120
Belgium	5,187	891	512	9,991	2,922	13,614	4,897	20,978	446	....	....	906	60,344
Bulgaria	....	....	....	....	171	823	40	390	....	....	....	....	1,424
Denmark	2,029	2,419	764	2,339	3,007	2,996	6,646	8,664	13,710	31,886	53,917	1,048	129,425
Finland	....	....	....	....	486	1,104	1,799	2,931	1,178	5,627	55	....	13,180
France	23,477	22,960	17,833	54,035	58,999	85,537	165,950	179,351	480,764	2,216,823	3,700,812	3,999,904	11,006,445
Germany	14,252	7,621	4,090	10,023	41,966	80,036	113,602	213,351	13,770	....	....	....	498,711
Gibraltar	....	....	....	57	....	100	....	514	229	617	525	61	2,103
Greece	....	....	427	....	100	454	379	807	2,010	24,724	12,604	4,675	46,180
Iceland and Faroe Is.	....	....	....	....	....	....	17	180	880	456	2,608	2,757	6,898
Italy	5,502	3,613	1,144	4,421	26,636	6,304	14,156	50,580	65,521	115,260	180,977	99,947	574,063
Malta, Gozo & Cyprus Is.	....	36	....	....	....	....	....	....	....	....	54	....	90
Netherlands	1,049	619	2,223	3,532	4,548	6,440	14,135	7,634	3,055	41,525	96,200	3,625	184,585

	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	Totals by Countries
Norway	$400	$622	$699	$2,684	$1,042	$934	$1,636	$1,893	$15,607	$59,769	$100,542	$18,855	$213,683
Portugal	....	....	205	394	1,618	865	920	2,357	3,239	45,356	66,929	20,274	142,157
Roumania	....	....	....	....	460	2,734	1,003	887	....	391	....	....	5,475
Russia in Europe	4,004	1,543	3,776	7,004	6,753	1,743	9,566	14,079	123,667	2,498,879	1,624,431	328,633	4,624,078
Serbia, Montenegro and Albania	....	....	....	....	....	113	....	....	....	4,932	....	....	5,045
Spain	3,620	129	260	2,854	2,267	3,755	3,192	6,266	7,347	32,743	95,720	154,850	313,003
Sweden	9,748	11,128	1,270	3,818	6,521	3,789	4,276	6,140	4,211	37,917	26,891	4,032	119,741
Switzerland	178	782	1,409	1,894	....	....	457	1,069	400	1,150	565	54	7,958
Turkey in Eu.	....	....	56	....	35	964	116	....	....	....	....	....	1,438
England	*116,248	175,093	125,726	240,329	320,755	931,909	922,866	....	267	....	....	....	27,051,087
Scotland			6,205	238	1,352	874	1,485	1,282,388	3,282,973	7,202,475	6,121,211	6,329,114	138,341
Ireland			6	54	350	523	451	23,269	29,403	52,414	22,146	955	10,287
No. America:								250	208	7,181	1,264	....	1,701
Bermuda	....	196	8	....	50	52	330	254	125	615	64	7	6,799
British Honduras	193	381	40	73	26	165	509	163	684	548	1,379	2,638	44,018,359
Canada	195,989	244,332	230,509	1,023,368	1,726,842	2,392,592	3,104,097	3,663,879	2,741,178	7,492,639	9,148,110	12,054,824	
Cent. Amer. States:													
Costa Rica	255	159	346	2,376	1,376	1,320	4,516	6,208	5,041	10,162	7,498	23,613	62,870
Guatemala	24	1,858	1,188	2,124	4,970	2,062	1,851	1,613	732	2,367	9,852	9,111	37,752
Honduras	1,465	104	61	48	61	151	308	1,053	6,870	15,649	12,639	11,952	50,361
Nicaragua	160	....	60	38	30	86	741	47	609	666	964	2,264	5,665
Panama	274	1,273	2,182	3,180	4,927	4,689	11,738	16,988	25,861	34,180	56,657	72,180	234,129
Salvador	....	....	843	526	1,195	2,790	2,242	2,481	2,371	3,717	11,314	10,179	37,658
Mexico	131,553	47,279	104,984	81,248	35,506	47,479	46,743	41,508	30,819	42,258	125,823	431,440	1,166,640
Miquelon, Langley and St. Pierre Is.	....	....	....	....	....	....	....	300	....	25	5	65	395
Newfoundland & Labrador	132	50	435	1,508	2,001	2,026	2,993	3,901	3,632	8,672	9,972	4,129	39,451
W. Indies: British—													
Barbados					3,866	3,209	5,055	4,177	4,216	6,383	14,452	15,089	56,447
Jamaica					11,003	23,569	25,355	24,693	32,327	53,867	54,854	65,429	317,601
Trinidad & Tobago	†2,310	3,804	6,295	14,085	1,817	4,847	9,119	13,003	12,865	21,826	44,060	55,794	163,331
Other Brit.					422	1,426	1,157	2,538	3,707	9,303	12,863	21,446	52,867
Cuba	18,095	39,169	27,385	49,088	31,323	31,594	35,928	48,217	101,429	411,731	906,710	1,028,276	2,728,945
Danish (Virgin Is. of U. S.)	....	....	39	....	....	558	1,640	1,206	865	975	1,876	2,844	10,003
Domin. Rep.	....	50	103	253	2,871	3,381	1,331	3,439	3,633	12,389	35,301	39,816	102,567
Dutch	....	17	....	....	242	281	1,767	2,754	4,598	3,288	6,052	4,707	23,689
French	50	128	164	101	20	97	198	8,099	7,423	9,546	24,672	53,518	104,016
Haiti	....	90	20	....	5	331	2,212	1,095	185	3,285	3,962	24,385	35,570
South Am.:													
Argentina	10,137	10,053	8,244	22,150	19,522	70,446	74,138	92,663	49,990	222,637	1,458,111	3,088,534	5,126,625
Bolivia	190	100	....	....	190	25	172	1,209	2,880	3,453	11,864	14,533	34,616
Brazil	8,665	8,690	8,527	7,802	15,769	35,680	108,859	84,602	28,633	59,935	134,326	233,414	724,902
Chile	3,527	2,988	1,348	663	484	2,656	4,711	22,405	14,721	72,939	248,043	806,015	1,180,500
Colombia	17	300	422	2,286	6,456	7,681	18,676	19,970	9,695	18,967	27,777	40,717	152,964
Ecuador	....	272	365	613	251	3,461	9,115	6,324	4,458	8,014	12,648	12,964	58,485
Guiana:													
British	....	128	852	1,303	2,012	3,181	3,809	4,583	5,116	6,809	23,597	35,081	86,471
Dutch	....	....	....	7	....	12	39	911	1,702	2,052	3,212	3,282	11,817
French	....	....	....	....	....	6	125	....	165	328	11	2,337	2,972
Paraguay	....	90	....	....	....	32	....	....	1,030	848	228	698	2,926
Peru	1,666	1,817	745	1,884	1,115	1,604	2,550	5,982	4,727	5,458	27,332	88,098	142,978
Uruguay	....	1,786	391	1,390	8,637	12,599	32,978	21,401	14,359	27,086	125,913	183,005	429,581
Venezuela	....	400	....	9	1,224	4,648	20,123	36,286	28,750	40,783	87,768	57,873	277,864
Asia:													
Aden	....	....	....	....	....	....	502	1,676	361	998	4,541	263	8,341
China	690	1,936	787	845	3,240	2,254	3,134	5,825	5,265	21,661	54,753	60,134	160,524
China:													
British	....	....	....	....	....	....	....	....	....	46	....	....	46
French	....	....	....	....	....	....	....	....	....	....	1,747	....	1,747
German	....	....	....	....	....	....	....	....	....	....	....	290	290
Japanese	....	....	....	....	....	....	....	....	....	....	....	382	382
Chosen	....	....	540	....	....	748	2,271	2,791	282	10,377	2,125	2,812	21,946
E. Indies: British—													
British Ind.	2,444	4,137	4,623	6,387	11,741	14,568	18,336	47,923	44,735	129,562	345,855	294,909	925,220
Straits Settlements	1,343	1,403	1,786	1,172	3,202	5,273	14,660	25,100	20,388	39,025	70,043	69,968	253,363
Other British	....	....	84	170	672	829	901	4,099	4,062	8,540	27,710	23,273	70,340
Dutch	1,758	5,168	5,135	4,577	2,627	3,452	11,453	15,368	15,232	34,638	193,225	192,430	485,063
French	....	....	....	....	....	....	....	....	274	....	....	1,998	2,272
Hongkong	123	296	252	290	119	2,711	92	626	1,088	2,180	2,885	7,702	18,364
Japan	5,021	586	498	3,375	4,997	39,681	51,619	35,637	26,028	30,446	116,130	319,038	633,056
Persia	....	....	....	....	....	....	....	....	174	....	....	1,090	1,264
Russia in As.	....	150	....	67	591	....	....	....	107,351	226,255	146,083	25,512	506,009
Siam	2,134	1,167	1,007	921	283	970	1,925	4,905	2,451	34,412	9,734	7,639	67,548
Turkey in As.	....	....	....	....	570	30	239	67	214	....	....	....	1,120
Oceania: British—													
Australia	3,826	7,148	14,227	21,533	53,940	102,427	166,176	202,363	199,154	389,690	753,309	1,052,986	2,966,779
New Zealand	25,625	1,752	1,392	5,150	16,306	26,095	37,438	53,644	48,111	176,618	285,654	309,658	987,443
Other British	....	....	....	....	311	971	479	1,060	665	1,991	4,751	4,674	14,902
French	....	....	....	....	200	495	3,032	7,560	5,730	5,640	4,383	6,272	33,312
German	....	....	....	....	....	....	220	396	....	66	936	7,138	8,756
Philip. Isl.	4,168	1,781	7,859	17,154	62,581	62,631	53,434	69,933	40,228	63,756	116,670	178,036	678,231
Africa:													
Belg. Congo	....	....	....	....	....	....	....	....	....	34	....	....	34
British—													
West	....	....	....	....	....	56	465	5,743	6,537	20,311	64,938	49,077	147,127
South	3,000	802	4,088	14,655	15,486	29,123	62,304	157,246	100,240	286,401	422,200	811,323	1,906,868
East	....	....	....	2,473	981	851	1,444	3,203	3,929	11,371	9,599	23,290	57,141
Canary Is.	....	....	23	76	30	13	879	1,505	1,939	2,111	3,261	1,300	11,137
Egypt	110	380	10	277	169	99	295	130	1,494	4,751	2,623	716	11,054
French Afr.	....	....	....	....	339	327	73	200	2,660	2,458	2,316	7,163	15,536
German Afr.	....	....	....	....	....	....	....	999	522	21,098	....	....	22,619
Liberia	....	....	....	....	....	....	....	....	13	....	33	106	152
Madagascar	....	....	....	....	....	....	....	....	....	....	4	175	179
Morocco	....	....	....	....	....	....	....	166	3,386	9,928	2,431	7,347	23,258
Portug. Afr.	....	74	38	47	115	910	1,222	1,585	3,431	7,064	5,339	1,160	20,985
Spanish Afr.	....	....	....	....	....	....	....	....	103	....	....	....	103
Totals	$611,355	$620,856	$605,179	$1,641,520	$2,544,180	$4,107,155	$5,240,599	$6,624,232	$7,853,183	$22,536,485	$27,420,913	$32,933,006	$112,738,663

*Included in totals of exports to England.
†Included in totals of exports to Jamaica.



Motorcycle Exports

(Prior to 1913 Motorcycles were included with "Bicycles")

	1913	1914	1915	1916	1917	1918	
Europe:							
Austria-Hungary		*29*	*7*				*36*
		$5,875	$1,535				$7,410
Azores and Madeira Islands				*1*			*1*
				$228			$228
Belgium	*25*	*65*	*1*				*91*
	$5,176	$11,803	$151				$17,130
Bulgaria							
Denmark	*38*	*239*	*149*	*784*	*757*	*2*	*1,969*
	$6,269	$43,325	$24,163	$128,186	$135,787	$650	$338,380
Finland	*21*	*78*					*99*
	$4,479	$13,798					$18,277
France	*39*	*132*	*56*	*216*	*78*	*90*	*611*
	$8,043	$29,663	$11,573	$36,121	$14,562	$20,946	$120,908
Germany	*96*	*231*	*2*				*329*
	$17,525	$48,201	597				$66,323
Gibraltar	*2*				*3*		*5*
	$338				$495		$833
Greece		*15*		*4*	*1*	*1*	*21*
		$2,230		$868	$293	$400	$3,791
Iceland and Faroe Islands						*8*	*8*
						2,000	$2,000
Italy	*115*	*342*	*121*	*790*	*1,666*	*1,940*	*4,974*
	$23,298	$70,054	$24,190	$147,223	$349,667	$464,661	$1,079,098
Netherlands	*18*	*89*	*348*	*998*	*1,224*		*2,677*
	$4,570	$17,885	$67,962	$190,512	$237,008		$517,937
Norway	*3*	*40*	*114*	*227*	*758*	*86*	*1,228*
	$805	$8,009	$20,656	$41,943	$162,126	$21,414	$254,953
Portugal	*16*	*89*	*91*	*197*	*241*	*222*	*856*
	$3,424	$19,014	$18,609	$41,031	$57,981	$56,045	$196,104
Roumania							
Russia in Europe	*85*	*408*	*649*	*2,103*	*14*		*3,259*
	$17,819	$75,505	$137,771	$494,338	$1,679		$727,112
Spain	*40*	*76*	*122*	*206*	*703*	*426*	*1,573*
	$9,220	$16,443	$21,472	$36,040	$146,398	$90,162	$319,735
Sweden	*14*	*179*	*90*	*467*	*1,059*	*73*	*1,872*
	$3,162	$34,106	$18,556	$88,325	$245,062	$13,071	$402,282
Switzerland		*5*	*6*			*2*	*13*
		$1,229	$1,327			$393	$2,949
Turkey in Europe	*1*						*1*
	$262						$262
England	*1,036*	*1,604*	*3,324*	*3,797*	*287*	*28*	*10,076*
	$203,734	$320,009	$578,836	$732,582	$61,710	$5,706	$1,902,577
Scotland	*4*	*16*	*33*	*109*			
	$828	$3,284	$8,393	$21,900			$34,405
Ireland				*50*			*50*
				$10,738			$10,738
North America:							
Bermuda				*1*			*1*
				$250			$250
British Honduras						*1*	*1*
						$39	$39
Canada	*1,335*	*1,065*	*832*	*927*	*1,064*	*1,041*	*6,264*
	$236,362	$193,987	$140,015	$148,409	$196,645	$198,739	$1,114,156
Central American States:							
Costa Rica	*6*			*2*	*3*		*11*
	$1,174			$1,418	$450		$3,042
Guatemala	*3*	*5*	*2*	*4*	*31*	*28*	*73*
	$671	$1,242	$442	$804	$8,125	$5,033	$16,317
Honduras			*5*	*4*	*2*	*2*	*13*
			$1,159	$330	$400	$575	$2,464
Nicaragua				*1*	*2*	*1*	*4*
				$200	$462	$290	$952
Panama	*27*	*32*	*59*	*76*	*61*	*62*	*317*
	$6,238	$7,725	$12,637	$15,387	$15,574	$16,710	$74,271
Salvador	*1*		*3*		*8*	*20*	*32*
	$200		$919		$1,638	$4,458	$7,215
Mexico	*48*	*26*	*8*	*51*	*102*	*59*	*294*
	$9,593	$5,481	$1,897	$9,877	$23,360	$14,622	$64,830
Newfoundland and Labrador	*3*	*8*	*7*	*12*	*5*	*3*	*38*
	$717	$1,998	$1,226	$2,505	$1,062	$750	$8,258
West Indies, British:							
Barbados		*6*	*11*	*5*	*11*	*14*	*47*
		$1,455	$2,585	$757	$2,204	$2,763	$9,764
Jamaica	*2*	*7*	*8*	*18*	*32*	*30*	*97*
	$500	$1,685	$1,625	$3,080	$4,672	$5,237	$16,799
Trinidad and Tobago		*16*	*14*	*12*	*26*	*14*	*82*
		$4,086	$2,833	$2,506	$5,318	$2,452	$17,195
Other British				*2*	*10*	*31*	*43*
				$480	$1,949	$4,167	$6,596
Cuba	*43*	*80*	*75*	*66*	*73*	*165*	*502*
	$8,285	$15,980	$13,880	$12,217	$15,076	$36,408	$101,846
Danish (Virgin Is. of U. S.)	*1*	*4*					*5*
	$146	$630					$776
Dominican Republic	*14*	*2*		*12*	*10*	*10*	*48*
	$2,945	$376		$1,733	$1,173	$1,029	$7,256
Dutch	*1*	*1*	*1*		*2*	*3*	*8*
	$166	$150	$196		$368	$904	$1,784
French			*2*		*5*	*4*	*11*
			$484		$900	$636	$2,020
Haiti	*1*				*4*	*14*	*19*
	$62				$1,015	$4,026	$5,103

PRIOR to 1913 the U. S. Bureau of Foreign and Domestic Commerce evidently did not consider that the motorcycle possessed sufficient importance to justify an individual set of figures in its official records, and accordingly it included the motorcycle with the ordinary push-bicycle. Those figures which are available seem to indicate that of late years the motorcycle occupies a position of some importance in the foreign trade of the country, as from 1913 to 1918 our exports were valued at $12,616,559, a value representing that of no less than 63,267 motorcycles.

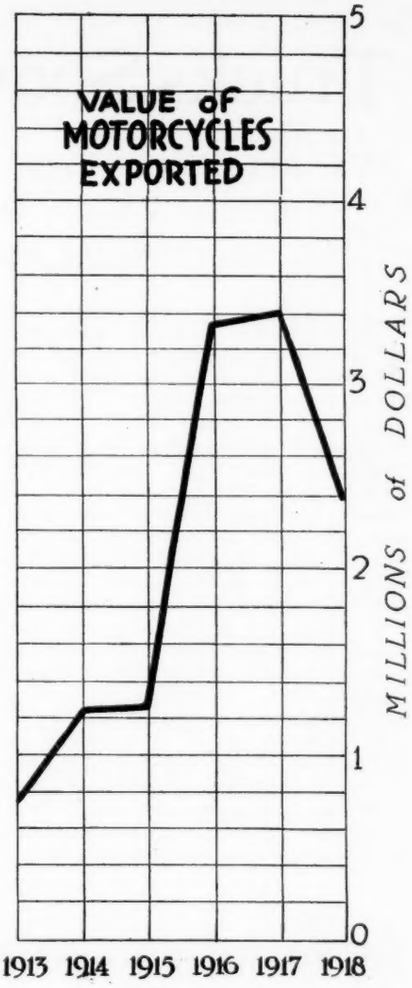
As is the case in certain other export tabulations in this issue of AUTOMOTIVE INDUSTRIES, war has shown a marked effect on the volume and value of our exports. Early in the struggle it was fully apparent that a motorcycle could travel under conditions impossible to an automobile, such as carrying reports and messages at speed over shell-shattered roads where the means of transport had frequently to be carried over obstructions or around or through shell-holes.

Hence it came about that although England, France and Italy had well-equipped motorcycle factories capable of

Covering Six Years

(Prior to 1913 Motorcycles were included with "Bicycles")

	1913	1914	1915	1916	1917	1918	
South America:							
	163	*110*	*69*	*111*	*173*	*227*	*853*
Argentina	$30,330	$23,470	$12,798	$20,299	$35,929	$48,655	$171,481
	.....	*1*	.....	*9*	*7*	*11*	*28*
Bolivia	.....	$261	.....	$1,606	$1,918	$2,151	$5,936
	57	*61*	*43*	*78*	*88*	*94*	*421*
Brazil	$12,090	$10,935	$7,743	$9,966	$16,051	$23,387	$80,172
	39	*37*	*2*	*14*	*34*	*88*	*214*
Chile	$8,134	$7,967	$570	$2,406	$6,389	$18,041	$43,507
	4	*9*	*11*	*12*	*11*	*13*	*60*
Colombia	$900	$2,066	$2,359	$2,607	$2,128	$2,472	$12,532
	2	*6*	*1*	*7*	*13*	*11*	*40*
Ecuador	$436	$852	$135	$1,493	$3,111	$2,216	$8,243
	2	*8*	*7*	*8*	*30*	*55*	*110*
Guiana, British	$338	$1,523	$1,356	$1,383	$5,047	$8,828	$18,475
	.....	.....	.....	*1*	.....	.....	*1*
Paraguay	.....	.....	.....	$196	.....	.....	$196
	.....	*3*	*3*	*8*	*25*	*5*	*44*
Peru	.....	632	$847	$1,576	$4,546	$1,103	$8,704
	15	*10*	.....	*21*	*49*	*26*	*121*
Uruguay	$2,921	$2,409	.....	$4,743	$9,207	$5,892	$25,172
	18	*23*	*4*	*4*	*22*	*2*	*73*
Venezuela	$3,466	$4,725	$912	$456	$4,746	$573	$14,878
Asia:							
	.....	.....	*2*	*14*	*6*	.....	*22*
Aden	.....	.....	$246	$2,431	$787	.....	$3,464
	18	*20*	*25*	*11*	*92*	.....	*166*
China	$4,542	$4,786	$6,790	$2,562	$16,943	.....	$35,623
	.....	.....	.....	.....	.....	*77*	*77*
China, British	.....	.....	.....	.....	.....	$13,822	$13,822
	.....	.....	.....	.....	.....	*2*	*2*
China, Japanese	.....	.....	.....	.....	.....	$350	$350
	6	.....	*2*	*7*	*23*	*10*	*48*
Chosen (Korea)	$1,350	.....	$413	$1,008	$4,852	$2,396	$10,019
East Indies, British:							
	4	*11*	*4*	*214*	*558*	*16*	*807*
British India	$570	$2,404	$925	$40,388	$111,411	$3,796	$159,494
	11	*11*	.....	*11*	*82*	*140*	*255*
Straits Settlements	$3,349	$2,116	.....	$1,789	$15,773	$30,899	$53,426
	2	*7*	*3*	*18*	*140*	*68*	*238*
Other British	$591	$1,811	$1,211	$3,050	$26,198	$16,192	$49,053
	3	*20*	*54*	*185*	*1,079*	*251*	*1,592*
Dutch	$642	$4,916	$11,871	$34,753	$229,167	$50,126	$331,475
	.....	*1*	*2*	*23*	*37*	*18*	*81*
Hongkong	.....	$325	$690	$4,353	$7,531	$3,070	$15,969
	137	*21*	*14*	*19*	*122*	*384*	*697*
Japan	$25,833	$4,548	$3,597	$3,191	$25,716	$78,324	$141,209
	.....	.....	.....	.....	.....	*2*	*2*
Persia	.....	.....	.....	.....	.....	$730	$730
	.....	*1*	.....	*18*	*21*	.....	*40*
Russia in Asia	.....	$115	.....	$3,738	$5,380	.....	$9,233
	.....	*3*	*6*	*6*	*21*	*17*	*53*
Siam	.....	$648	$1,375	$1,189	$3,626	$3,311	$10,149
	1	*1*	.....	.....	.....	.....	*2*
Turkey in Asia	$206	$152	.....	.....	.....	.....	$358
Oceania: British:							
	24	*786*	*709*	*2,394*	*2,998*	*1,678*	*8,589*
Australia	$4,706	$132,998	$137,269	$475,157	$634,011	$380,786	$1,764,927
	136	*29*	*333*	*1,576*	*1,108*	*731*	*3,913*
New Zealand	$22,664	$6,029	$49,072	$282,049	$236,432	$157,432	$753,678
	.....	.....	*11*	*10*	*5*	*1*	*27*
Other British	.....	.....	$1,560	$2,120	$1,330	$267	$5,277
	6	.....	.....	.....	*2*	*4*	*12*
French	$1,157	.....	.....	.....	$628	$1,186	$2,971
	.....	.....	.....	.....	*1*	*1*	*2*
German	.....	.....	.....	.....	$298	$96	$394
	257	*134*	*135*	*247*	*142*	*163*	*1,078*
Philippine Islands	$42,052	$25,690	$29,383	$51,276	$30,743	$35,725	$214,869
Africa:							
	.....	.....	.....	.....	.....	*1*	*1*
Belgian Kongo	.....	.....	.....	.....	.....	$289	$289
	.....	*2*	*2*	*72*	*29*	*86*	*191*
British Africa, West	.....	$418	$396	$15,689	$3,575	$12,336	$32,414
	40	*187*	*555*	*1,144*	*1,364*	*1,874*	*5,164*
South	$6,784	$33,659	$101,210	$204,302	$252,478	$449,846	$1,048,279
	.....	*1*	*6*	*69*	*32*	*155*	*263*
East	.....	$251	$834	$12,210	$5,033	$34,358	$52,686
	.....	*2*	*14*	*9*	*5*	.....	*30*
Canary Islands	.....	$493	$2,732	$2,056	$984	.....	$6,265
	.....	*4*	*2*	*20*	*39*	.....	*65*
Egypt	.....	$739	$438	$3,559	$7,251	.....	$11,987
	.....	.....	.....	.....	*1*	*1*	*2*
French Africa	.....	.....	.....	.....	$432	$237	$669
	.....	*1*	*1*	.....	.....	.....	*2*
German Africa	.....	$201	$473	.....	.....	.....	$674
	.....	.....	.....	.....	*2*	.....	*2*
Liberia	.....	.....	.....	.....	$300	.....	$300
	.....	.....	.....	*3*	*1*	.....	*4*
Madagascar	.....	.....	.....	$502	$217	.....	$719
	.....	.....	*1*	.....	*1*	*1*	*3*
Morocco	.....	.....	$283	.....	$355	$360	$998
	.....	*11*	*5*	*23*	*4*	*3*	*46*
Portuguese Africa	.....	$1,827	$999	$5,000	$1,034	$520	$9,380
	.....	.....	.....	*2*	.....	*3*	*5*
Spanish Africa	.....	.....	.....	$575	.....	$638	$1,213
Totals: Number	*3,983*	*6,410*	*8,166*	*19,500*	*16,609*	*10,599*	*63,267*
Value	$749,072	$1,234,194	$1,494,176	$3,369,616	$3,404,716	$2,364,785	$12,616,559



producing large numbers of machines, we received hurry calls for all available supplies. Our prompt and effective response is shown by the figures given herewith.

Of course we have, apart from the temporary demand created by war, a world-wide trade in motorcycles. In this connection it is of interest to note that the smaller countries, far removed from the fighting zone, are consistently improving as motorcycle buyers. For instance, Siam, a country which but a few years ago was utterly dissociated in the public mind with things mechanical, seems to be adopting the motorcycle.

Perhaps the principal lesson to be learned from this tabulation of motorcycle exports is that the American machine is now thoroughly known in districts in which, before the war, few motorcycles of any kind were seen; that repeat orders from foreign governments and from distributers and dealers prove that it is appreciated as well as merely known, and that the conditions prevailing during the past few years have given the United States motorcycle manufacturer an opportunity to further cultivate his interests abroad.

Trucks Show Few Mechanical Changes

War Activities of Engineers Have Retarded Mechanical Development in Commercial Vehicle Design—Curtailment of Supplies of Raw Material Has Reduced Production Originally Planned

FEW changes involving either basic design or refinement in detail have been made in the gasoline trucks offered on the 1919 market as compared with those produced in 1918. No doubt the primary cause is that the abnormal conditions under which this branch of the automotive industry (in common with others) has been operated during the past year acted as a deterrent to development along lines other than those of accepted engineering practice. Another reason is that truck design under the severe demands of war-service has advanced so rapidly since 1914 that it has reached a point of relative excellence which leaves but little to be desired from a purely mechanical point of view.

There is still much to be done in the development of the gasoline truck from a strictly utilitarian point of view, and doubtless engineering skill will lend its aid in this direction, supplementing the efforts of the sales organization to perfect a program planned to provide the maximum of earning capacity at a minimum of operating cost and a well-devised system of distribution, service and maintenance.

A Readjustment of Sizes

Obviously the load capacity of a truck is determined by the maker on the basis of demand. Trucks are built in capacities ranging from under half a ton to over 7 tons, and it is apparent that there is work suited both to the extremes as well as to the intermediates.

While the 1-ton truck still leads the field in respect of the number produced, the greatest gain in the number of models of any given size offered for 1919 is in the 1½-ton classification. Twenty-four more models of this size are listed than were offered in 1918. If the popularity of a size be judged by the number of models offered, the 2-ton truck leads the field for 1919 with 89 distinct offerings. It is followed closely by the 1½-ton size with 75 models, the 1-tonner with 68, the 3½-tonner with 62 and the 5 and 5½-tonners with 59.

Taking the six-year period from 1913 to 1919 the 3½-ton truck has shown the greatest gain, the 41 models now offered being over seven times the number marketed in 1913. The 2½-ton truck has also gained in favor during this period.

Price Tendency Is Upward

Owing to the additional cost of material, labor, etc., there has been a general increase in truck prices. There have been no advances which were not fully justified by abnormal production conditions and there is no indication of any downward trend. In fact it is more than likely that some further advances may be announced in the spring, but it is impossible to prophesy with conditions as they are at present.

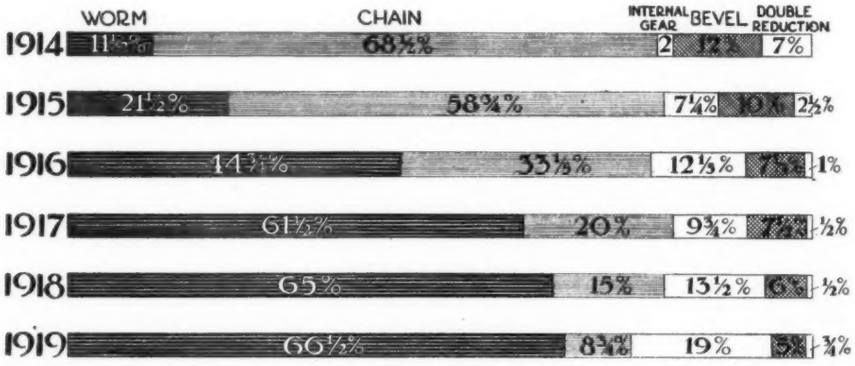
For the reason that prices have been advanced almost daily it is not easy to calculate the precise percentage representing the difference between 1918 and 1919 prices. A careful calculation made in November and based on actual current figures furnished by manufacturers showed that at that time the average increase in all models and sizes of trucks was 17.1 per cent. As a matter of fact individual prices advanced anywhere from 10 to 20 per cent and at the present time it may be safely assumed that the average advance is in the region of the latter figure.

It should not be forgotten that with wartime restrictions it was a matter of practical impossibiliy to increase production for commercial service (as distinct from Government work) and thus reduce overhead charges to a point which would permit of the truck being sold at the same price as before.

It is of interest to observe that the standard army truck has not yet affected to any appreciable extent the design of the regular commercial models. It is not likely that any modification embodied in army trucks will be adopted until present orders for standard commercial vehicles are filled. Then, should such a course be considered advisable, the various parts makers will be ready with the various jigs and tools formerly used in Government work and now available for other service.

1919 Mechanical Practice

As already pointed out there are practically no novelties or departures from generally accepted standard design, but

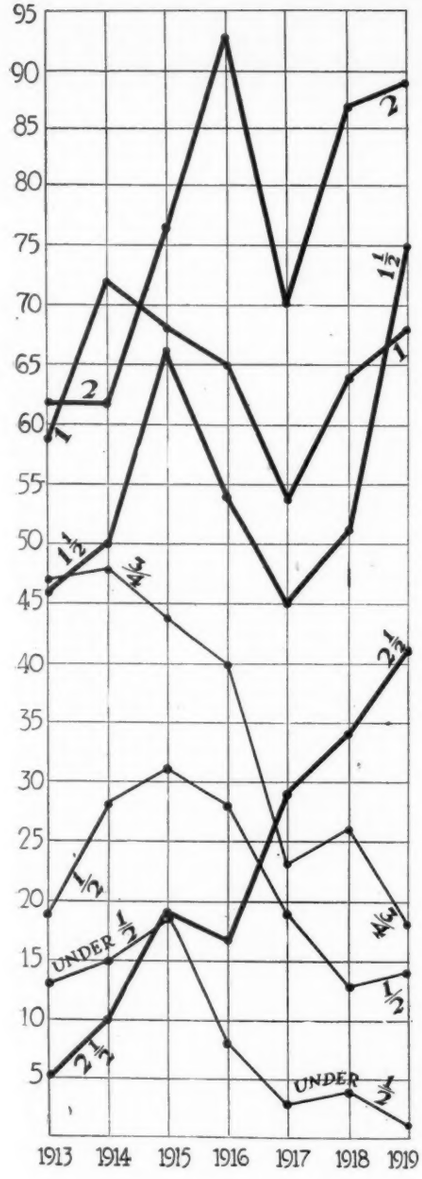


FINAL DRIVE BY MODELS OFFERED

The final drive averages shown above are calculated on the number of models offered in each particular year and as included in the specifications of those trucks published by the Class Journal Co. for that year. The averages must not be confused with those on the same subject based on the production of trucks. The latter averages are given below, so that the true situation in regard to types of final drive may be had both from the basis of number of models offered and of number of trucks produced. The above percentages indicate the decline in the chain drive for some form of inclosed drive

FINAL DRIVE BASED ON PRODUCTION

The above are averages calculated for the year 1918. The 1916 production was 98,000 trucks; 190,000 in 1917 and 250,000 in 1918. Thus, while the percentage of bevel-driven trucks decreased 2¼ per cent in 1918, there were actually more bevel-driven trucks made in 1918 than in 1917



Truck Design for 1919

THERE are very few mechanical changes, standardization of parts may be considered as accomplished and developments may be expected now that the factories are reorganizing on a peace-time basis of operation.

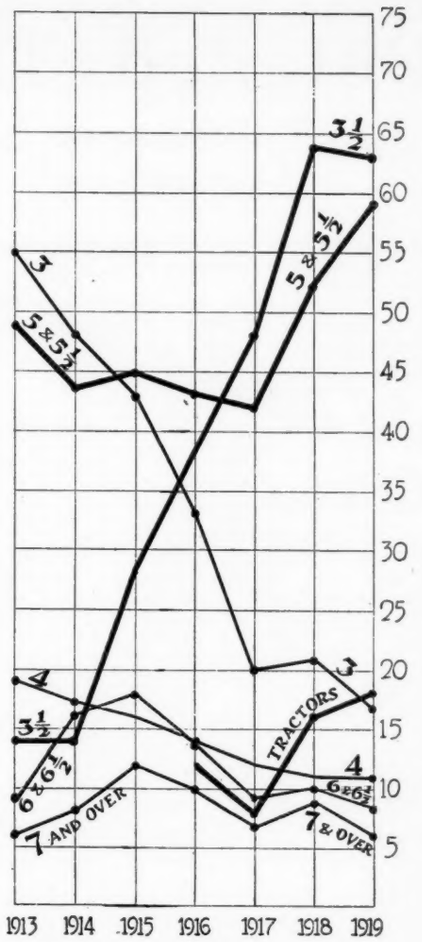
Three and one-half ton trucks show the greatest gain in number of models offered, although the one-tonner leads in actual number.

There has been little attempt made to solve the problem of using heavy fuel.

Amidship gearsets have increased in number, no doubt for the reason that they tend to prevent shaft-whipping.

Chain drive continues to give way to drives of one or other of the enclosed types.

Worm drive appears to be the favorite on trucks of ½, 1, 1½, 2, 2½, 3½ and 5 tons, as indicated by averages of all models. Hotchkiss type of drive continues to be popular.



These curves and the ones opposite are based on specifications compiled during the past 7 years by the Class Journal Co. and do not take into account the number of vehicles of a given model sold. The heavy lines indicate an increase in the number of models of a given size and the light lines a decrease

there are one or two exceptions of interest.

Perhaps one of the most important of these is the new type of double-reduction axle brought out by White. In this the second reduction is secured at the wheel instead of in the differential housing. This axle has several other unusual characteristics and has been under development and test for several years.

Size of Engines Increased

In engines the tendency is to increase size. For example, the average engine on the ¾-tonners has been increased from 3¼ x 5 to 3½ x 5, with a corresponding increase in horsepower from 16.92 to 19.61. The average engine of the 1-ton truck is now 3¾ x 5 as compared with 3½ x 5 in 1918.

In gearsets there is a tendency to adopt the use of four speeds in trucks for the 3 to the 5-ton sizes. Side chains are disappearing and are being replaced by one or other of the forms of enclosed drive. As evidence of this, chain-driven trucks are now but 8¾ per cent of the total production as against 15 per cent in 1918. On a production basis chain-driven trucks for 1918 were but 6 per cent of the total as compared with 9 per cent in 1917. Both worm and internal-gear driven trucks show increases, bevel drives are fewer and trucks with double-reduction drive have increased both on the basis of the number of models offered and on that of production.

Hotchkiss drive has held its position except in the case of 5-ton trucks, where radius rods are used on the majority of the models offered for propulsive purposes. Better brake lay-outs and the use of longer springs which are practically flat under load have overcome any earlier difficulties arising from the use of this type of drive.

Automatic control of engine temperature has not progressed to any great extent during the past year, although at the beginning of 1918 it was prophesied that the conventional cooling system would be discarded in favor of a system with automatic control. At the same time it is evident that some form of improved cooling will sooner or later be developed in order to insure greater engine efficiency throughout the climatic range from winter to summer.

Solid and Pneumatic Tires

Where solid tires are regular equipment, the pressed-on type is becoming practically universal. This has been brought about to some extent by the considerable increase in the number of tire presses available throughout the country. There appears to be little change in the ratio of the use of giant single tires on the rear wheels as compared with dual solids.

There has been a normal growth in the use of pneumatic tires for trucks of up to 2 and 3-ton capacities and it is indicated that the use of giant pneumatics for trucks of around 5-ton capacity will be extended.

Detailed Technical Specifications

Details of 489 Gasoline, 19 Electric and One Steam Motor Truck Chassis and Makes of Principal Truck Parts, Including Engines, Clutches, Gearsets,

Name and Model	Tons Capacity	Chassis Price	Wheelbase Inches	FRAME			TIRES			Wheels	ENGINE														
							Size in Ins.							COOLING			IGNITION			ELEC. SYSTEM			GOVERNOR		
				Make	Material	Type	Kind	Front	Rear		Make	No. Cyl., Bore and Stroke—N.A.C.C. Hp.	Cylinders Cast	Water Circ.	Radiator Make	Radiator Core and Case	Type	Make	Spark Advance	Type	Make	Extra Cost, $	Type	Make	Drive
A. & B.	3T	3		144	own	rol-c	s-flex	s	48x3½d	48x3½d	wd	own	4-5 17x4½-42.8	2	g-p	Bush	fin-sht	dual	Bosch	hand	none	none	none	none	none	
A. & B.	5T	5		144	own	rol-c	s-flex	s	48x3½d	48x5d	wd	own	4 5.17x4½-42.8	2	g-p	Bush	fin-sht	dual	Bosch	hand	none	none		none	none	
Acason	B	1½	$2,500	150				s	36x3½	36x5		Wau	4-3½x5½-22.5	2	cent			sing	Eismn	hand	ltg*			cent	Wau	motor
Acason	H	2	2,850	150	Savg	p-stl	s-flex	s	36x4	36x7	wd	Wau	4-4½x5½-29.0	2	cent	G&O	sq-t-cst	sing	Eismn	hand	ltg	Nlite	75	cent	Wau	motor
Acason	L	3½	3,700	172	Savg	p-stl	s-flex	s	36x5	36x5d	wd	Wau	4-4½x6½-29.0	2	cent	G&O	sq-t-cst	sing	Eismn	hand	ltg	Nlite	75	cent	Wau	motor
Acason	M	5	4,700	172	Savg	p-stl	s-flex	s	36x6	40x6d	c-s	Wau	4-4½x6½-36.1	2	cent	G&O	sq-t-cst	sing	Eismn	hand	ltg	Nlite	75	cent	Wau	motor
Acason	Light Tractor	6	2,950	114				s	36x4	36x7		Wau	4-4½x5½-29.0	2	cent			sing	Eismn	hand	ltg*			cent	Wau	motor
Acason	Heavy Tractor	10	4,300	130				s	36x5	36x5d		Wau	4-4½x6½-36.1	2	cent			sing	Eismn	hand	ltg*			cent	Wau	motor
Acme	B	1	1,950	130	Smth	p-stl	s-flex	s	34x3½	34x5	wd	Con	4-3½x5-22.5	4	ther	Long	fin-sht	sing	Eismn	hand	opt	G&D		cent	Duplx	
Acme	A	2	2,750	148	Smth	p-stl	s-flex	s	36x4	36x7	wd	Con	4-4½x5½-27.2	4	cent	G&O	fin-cst	sing	Eismn	hand	ltg		85	cent	Duplx	gst
Acme	C	3½	3,650	168	Smth	p-stl	s-flex	s	36x5	40x5d	wd	Con	4-4½x5½-32.4	2	cent	G&O	fin-cst	sing	Eismn	hand	ltg		85	cent	Duplx	motor
Acme	E	5	4,750	180	Smth	p-stl	s-flex	s	36x6	40x6d	c-s	Con	4-4½x6 -36.1	2	cent	G&O	fin-cst	sing	Eismn	hand	none	none		l-b	Con	motor
Air-O-Flex	183	2		146	own	p-stl	s-flex	s	36x4	36x7	wd	Con	4-4½x5½-27.2	4	cent		fin-cst	sing	A-K	hand	s,l&i2	Bijur		cent	Duplx	motor
All American	AA	1	1,295	130	Dtrt	p-stl	s-flex	p&s	33x4	32x4	wd	H-S	4-3½x5 -16.9	4	ther	Stan	cel-cst	sing	Dixie	fix	none	none		none	none	none
American	E	2						s	36x4	36x7		Buda	4-4½x5½-29.0					sing	Eismn	auto		West		cent	Pierce	motor
American	E	3½						s*	36x5	36x10		Buda	4-4½x5½-29.0					sing	Eismn	auto		West		cent	Pierce	motor
American	E	5						s*	36x6	40x12		Buda	4-4½x6 -32.4					sing	Eismn	auto		West		cent	Pierce	motor
Annleder	HW	2		166	Smth	p-stl	s-flex	s	36x4	36x4d	wd	Con	4-4½x5½-27.2	4	cent	Long	fin-c-st	sing	Bosch	hand	none	none		suc	Pierce	motor
Annleder	KW	3½		186	own	rol-i	flex	s	36x5	36x5d	wd	Con	4-4½x5½-32.4	2	cent	own	fin-c-a	sing	Bosch	hand	none	none		suc	Pierce	motor
Atlas	19	¾	1,135	118	Prsh	p-stl		pnu	32x4	32x4	wd	Lyc	4-3½x5 -19.6	4	ther	Jas	sq-t-pst	sing	Remy	hand	sl&i	Remy				
Atterbury	7R	1½	2,575	140½	Savg	p-stl	flex	s	36x3½	36x5	wd	Con	4-4½x5½-27.2	4	cent	Long	fin-c-a	sing	Eismn	fix	none	none	none	cent	Pierce	motor
Atterbury	7C	2	2,975	153½	Savg	p-stl	flex	s	36x4	36x4d	wd	Con	4-4½x5½-27.2	4	cent	Long	fin-c-a	sing	Eismn	fix	none	none	none	cent	Pierce	motor
Atterbury	7D	3½	3,875	167½	Savg	p-stl	flex	s	36x5	40x5d	wd	Con	4-4½x5½-32.4	2	cent	Long	fin-c-a	sing	Eismn	hand	none	none	none	cent	Pierce	motor
Atterbury	8E	5	4,975	167½	Savg	p-stl	flex	s	36x5	40x6d	c-s	Con	4-4½x6 -36.1	2	cent	own	fin-c-a	dual	Eismn	hand	ltg2	Delco	none	l-b	Con	motor
Autocar	XXI-F	2	2,050	97	own	p-stl	s-flex	opt	34x4s	34x5s	wd	own	2-4½x4½-18.1	1	cent	own	fin-cht	sing	Bosc*	fix	none	none	none	none	none	
Autohorse	10	5	2,100		own	rol-c	rigid	s	34x10		wd	Con	4-3½x5 -22.5	4	cent	Eur	zz-t-ps	sing	Koko	hand	none	none	none	cent	opt	
Available	1	1	2,250	132				s	36x3½	36x5		Con	4-3½x5 -22.5	4	ther			sing	Bosch	fix						
Available	2	2	2,950	144	own	rol-c	s-flex	s	36x4	36x6	wd	Con	4-4½x5½-27.2	4	cent	Chgo	fin-p-stl	sing	Bosch	fix	none	none	none	cent	Pierce	motor
Available	3	3½	4,200	150	own	rol-c	s-flex	s	36x5	40x5d	wd	Con	4-4½x5½-32.4	2	cent	Chgo	fin-p-stl	sing	Bosch	fix	none	none	none	cent	Pierce	motor
Available	5	5	4,900	168				s	36x6	40x6d		Con	4-4½x5½-32.4	2	cent			sing	Bosch	fix				cent	Pierce	motor
Beck	A	1	1,350	124	P&B	p-stl		s	34x3	34x4	wd	Con	4-3½x5 -19.6	4	ther	Idl	cel-sht			fix				cent	Pierce	motor
Beck	B	1½	1,950	144	P&B	p-stl		s	34x3½	34x5	wd	Con	4-3½x5 -22.5	4	ther	Idl	cel-sht		Bosch	fix				cent	Pierce	motor
Beck	C	2	2,250	144	P&B	p-stl		s	36x3½	36x6	wd	Con	4-4½x5½-27.2	4	g-p	Idl	cel-cst		Bosch	fix				cent	Pierce	motor
Beech Creek	3A	3	3,850	132				s	36x6	36x6		Wau	4-4½x5½-29.0	2	cent			sing	Eismn	hand				cent	Wau	motor
Bessemer	G	1	1,450	124	Savg	p-stl	s-flex	s	34x3½	34x4	wd	Con	4-3½x5 -19.6	4	ther	Idl	cel-sht	sing	Spltf	hand	none	none		none	none	none
Bessemer	H	1½	1,945	144	P&B	p-stl	s-flex	s	36x3½	36x5	wd	Con	4-3½x5 -22.5	4	ther	Idl	cel-cst	sing	Spltf	hand	opt	opt		none	none	none
Bessemer	J	2	2,490	158	P&B	p-stl	s-flex	s	36x4	36x4d	wd	Con	4-4½x5½-27.2	4	cent	Idl	cel-cst	sing	Spltf	hand	opt	opt		cent	Pierce	motor
Bessemer	K	3½	3,450	175	P&B	p-stl	s-flex	s	36x5	36x5d	wd	Con	4-4½x5½-32.4	2	cent	Idl	cel-cst	sing	Spltf	hand	opt	opt		cent	Pierce	motor
Bethlehem	D	1½	1,965	136	Dtrt	p-stl	s-flex	s	34x3½	34x5	wd	N.A	4-3½x4½-22.5	2	ther	Fed	cel-cst	sing	A-K	hand	sl&i2	G&D*		suc	Mnrch	motor
Bethlehem	E	2½	2,367	144	Dtrt	p-stl	s-flex	s	34x4	34x6	wd	N.A	4-4 x4½-25.6	2	ther	Fed	cel-cst	sing	A-K	hand	sl&i2	G&D*		suc	Mnrch	motor
Bethlehem	F	3½	2,365	162	Dtrt	p-stl	s-flex	s	34x4	34x5d	wd	N.A	4-4½x6 -30.6	2	g-p	Fed	cel-cst	sing	A-K	hand	sl&i2	G&D*		suc	Mnrch	motor
Bourne	VM	2	3,500	143				s	36x4	36x8		Herc	4-4 x5½-25.6	1	cent			sing	Eismn	fix	s&l	Entz		cent	Simplx	motor
Bourne	XM	3½	4,200	160	own			s	36x5	36x10		Herc	4-4½x5½-29.0	1	cent			sing	Eismn	fix	s&l	Entz		cent	Simplx	motor
Brinton	H	1	1,500	125	own			pnu	33x4½	33x4½	wd	Wis	4-3½x5 -16.9	4	ther		fin-sht	sing		fix				none	none	
Brinton	F	2½	3,000	140				s	36x4	36x6	wd	Con	4-4½x5½-27.2	4	cent		fin-sht	sing	Bosch	fix			none	cent	Pierce	motor
Briscoe	4-24	½	885	104	own	p-stl	s-flex	pnu	31x4	31x4	wd	own	4-3½x5½-16.2	4	ther	S-W	zz-t-sht	sing	Conn	hand	sl&i2	Aut-L	none	none	none	
Briscoe	T-34	1		121	Prsh	p-stl	s-flex	p&s	33x4	34x4	wd	Con	4-3½x5 -18.2	4	ther	Perf	zz-t-cst	sing	Conn	hand	sl&i2	Aut-L	none	none	none	
Brockway	J2	1½	2,450	140	Prsh	p-stl	s-flex	s	36x3½	36x5	wd	Con	4-3½x5 -22.5	4	ther	Bush	fin-cst	sing	Eismn	fix	none	none	none	none	none	none
Brockway	K3	2	2,850	148	Prsh	p-stl	s-flex	s	36x4	36x7	wd	Con	4-4½x5½-27.2	4	cent	Bush	fin-cst	sing	Eismn	hand	none	none	none	none	none	none
Brockway	R	3½	3,750	164	Prsh	p-stl	s-flex	s	36x5	36x5d	wd	Con	4-4½x5½-32.4	2	cent	Bush	fin-cst	sing	Eismn	hand	none	none	none	none	none	none
Chase	A	1	1,725	138				s	36x3½	36x5		Wau	4-3½x5½-19.6	4				sing	Bosch	fix				suc	Mnrch	motor
Chase	C	1½	2,025	149				s	36x3½	36x6		Wau	4-3½x5½-19.6	4				sing	Bosch	fix				suc	Mnrch	motor
Chase	B	2½	2,475	160				s	36x4	36x4d		Buda	4-4½x5½-27.2	4				sing	Bosch					suc	Mnrch	motor
Chase	X	3	2,800	160				s	36x4	36x5d		Buda	4-4½x5½-27.2	4				sing	Bosch	fix				suc	Mnrch	motor
Chase	O	3½	3,000	175				s	36x5	36x5d		Con*	4-4½x5½-32.4	2				sing	Bosch	hand	s&l	Dneto		suc	Mnrch	motor
Chevrolet	T	1		125	own	rol-c	s-flex	p&s	31x4	32x4	wd	own	4-3½x5½-21.7	4	cent	Har	cel-pst	sing	Remy	hand	sl&i2	Aut-L		suc	Mnrch	motor

ABBREVIATIONS—Types of Construction

***Other Options**
amid—amidships
auto—automatic
bevl—bevel
c—center
c&l—center and left
c&s—cushion and solid
cent—centrifugal
c-s—cast steel
c-a—cast aluminum
cel-cst—cellular core, cast case
cel-pst—cellular core, pressed steel case
cel-sht—cellular core, sheet case
chn—chain
cylinders cast, 2 in pairs
cylinders cast, 4 in block
cylinders cast, 3 in threes
cylinders cast, 1 singly
d-d—dry disk
d-p—dry plate
d-rd—double reduction
d-s—driveshaft
elec—electric
ext-d-s—external driveshaft
ext-f-w—external front wheels
ext-g—external gear
ext-jst—external jackshaft
ext-r-w—external rear wheel
fab—fabric
fin—finned tube
fin-c-a—finned tube core, cast aluminum case
fin-cst—finned tube core, cast case
fin-pst—finned tube core, pressed steel case
fin-sht—finned tube core, sheet case
fix—fixed
flex—flexible
fric—friction
g.p.—gear pump
grav—gravity
gset—gearset
hyd—hydraulic
ind-c—individual clutch
int-d-s—internal driveshaft
int-f-w—internal front wheels
in-g—internal gear
in-g-4—internal gear drive on 4 wheels
int-r-w—internal rear wheel
jst—unit with jackshaft
l—left
l&c—left and center
leat—leather
l-b—loose ball
ltg—lighting
metl—metal
mtr—unit with motor
opt—optional
p—plate in oil
pist—piston pump
plan—planetary
pnu—pneumatic
pres—pressure
prog—progressive sliding gearset
p-t-c-a—plain tube core, cast aluminum case
p-t-cst—plain tube core, cast case
p-stl—pressed steel
p&s—pneumatic and solid
r—right
r-ax—unit with rear axle
rng-cst—ring core, cast case
rol-c—rolled channel
rol-i—rolled I-beam
r-rd—radius rods
selec—selective sliding gear
s-flex—semi-flexible
stg—starting
s&l—starting and lighting
s,l&i—starting, lighting and ignition
s,l&i2—starting, lighting and ignition, two-unit
sing—single
s—solid
s&c—solid and cushion
spgs—springs
sq-t-cst—square tube core, cast iron
sq-t-sht—square tube core, sheet case
stk—stock
sub-f—sub-frame
suc—suction
s-bev—spiral bevel
ther—thermo-syphon
tor-a—torque arm
t-t—torsion tube
unt-x—unit with axle
vacm—vacuum
wd—wood
w-d—multiple disk in oil
worm—top worm
w-p—wet plate
zz-t-cst—zig zag tube core, cast case
zz-t-pst—zig zag tube core, pressed steel case
zz-t-sht—zig zag tube core, sheet case

# of Gasoline Motor Trucks for 1919

As Produced by 219 American Manufacturers—Full Particulars on Types Rear Axles, Steering Gears, Governors and Also Electric and Fuel Systems

ENGINE						TRANSMISSION										BRAKES		CONTROL			UNIVERSALS		
SPEED		FUEL SYS.		CLUTCH		GEARSET				FINAL DRIVE								STEERING GEAR					
Motor's R.p.m.	Truck in M.p.h.	Carbureter Make	Fuel Feed	Type	Make	Type	Make	Placed	Speeds	Type	Axle Make	Total Gear Reduction	Propulsion Taken By	Torque Taken By	Springs Make	Foot	Hand	Placed	Make	Levers	Type	Make	Name and Model
.....	.....	Schblr..	grav..	none..	none...	elec....	none...	amid..	2	in-g...	own....	.....	r-rd....	r-rd....	Perf...	ext-r-w.	ext-f-w.	r....	Gem..	r....	metl...	Franck.	A. & B.....37
.....	.....	Schblr..	grav..	none..	none...	elec....	none...	amid..	2	in-g...	own....	.....	r-rd....	r-rd....	Perf...	ext-r-w.	ext-f-w.	r....	Gem..	r....	metl...	Franck.	A. & B.....57
1,500	18	Stmbg..	vacm..	d-p...	B-Beck.	selec...	Cover..	mtr...	3	worm..	Timkn.	9.2	spgs...	spgs...	Dtrt...	int-r-w.	int-r-w.	.....	Ross..	.....	metl...	Spicer..	Acason.....B
1,200	15	Stmbg..	vacm..	d-d...	Muncie	selec...	Muncie	mtr...	4	worm..	Timkn.	8.75	spgs...	spgs...	Dtrt...	int-r-w.	int-r-w.	r....	Ross..	c....	metl...	Blood..	Acason.....H
1,200	12	Stmbg..	vacm..	d-d...	Muncie	selec...	Muncie	mtr...	4	worm..	Timkn.	10.33	spgs...	spgs...	Dtrt...	int-r-w.	int-r-w.	r....	Ross..	c....	metl...	Blood..	Acason.....L
1,000	10	Stmbg..	vacm..	d-p...	B-Beck.	ind-c...	Cotta..	mtr...	3	worm..	Timkn.	.....	spgs...	spgs...	Dtrt...	int-r-w.	int-r-w.	r....	Ross..	c....	metl...	Blood..	Acason.....M
1,200	15	Stmbg..	vacm..	d-d...	Muncie	selec...	Muncie	mtr...	4	worm..	Timkn.	9.25	spgs...	spgs...	Dtrt...	int-r-w.	int-r-w.	.....	Ross..	.....	metl...	Spicer..	Acason... Light Tractor
1,000	10	Stmbg..	vacm..	d-p...	B-Beck.	selec...	Cotta..	mtr...	3	worm..	Timkn.	10.33	spgs...	spgs...	Dtrt...	int-r-w.	int-r-w.	.....	Ross..	.....	metl...	Spicer..	Acason...Heavy Tractor
1,700	22	Rayfld.	vacm..	d-p...	B-Beck.	ind-c...	Cotta..	mtr...	3	worm..	Timkn.	7.75	spgs...	spgs...	Dtrt...	int-r-w.	int-r-w.	l....	Ross..	c....	metl...	Blood..	Acme.....B
1,500	17½	Rayfld.	vacm..	d-p...	B-Beck.	ind-c...	Cotta..	mtr...	3	worm..	Timkn.	8.50	spgs...	spgs...	Dtrt...	int-r-w.	int-r-w.	l....	Ross..	c....	metl...	Blood..	Acme.....A
1,200	14	Rayfld.	vacm..	d-p...	B-Beck.	ind-c...	Cotta..	amid..	3	worm..	Timkn.	12	r-rd....	spgs...	Dtrt...	int-r-w.	int-r-w.	l....	Ross..	c....	metl...	Blood..	Acme.....C
1,250	12½	Rayfld.	vacm..	d-p...	B-Beck.	ind-c...	Cotta..	amid..	3	worm..	Timkn.	11.66	r-rd....	spgs...	.....	int-r-w.	int-r-w.	l....	Ross..	c....	metl...	Blood..	Acme.....E
1,800	30	Stmbg..	grav..	d-p...	Hoosier	selec...	B-Lipe.	amid..	4	in-g...	Russl..	.....	r-rd....	r-rd....	.....	ext-d-s.	ext-r-w.	l....	Lavn..	c....	metl...	Spicer..	Air-C-Flex.....183
2,250	32.9	Zenith..	grav..	d-p...	B-Beck.	selec...	G-Lees.	mtr...	3	in-g...	Torbn..	6.5	spgs...	spgs...	Rowl...	ext-r-w.	int-r-w.	l....	Ross..	c....	metl...	Dtrt...	All American.....AA
.....	.....	Schblr..	.....	.....	B-Lipe.	ind-c...	B-Lipe.	.....	.....	worm..	Timkn.	.....	.....	.....	.....	.....	.....	r....	Ross..	r....	none..	none..	American.....E
.....	.....	Schblr..	.....	.....	B-Lipe.	ind-c...	B-Lipe.	.....	.....	worm..	Timkn.	.....	.....	.....	.....	.....	.....	r....	Ross..	r....	none..	none..	American.....E
.....	.....	Schblr..	.....	.....	B-Lipe.	ind-c...	B-Lipe.	.....	.....	worm..	Timkn.	.....	.....	.....	.....	.....	.....	r....	Ross..	r....	none..	none..	American.....E
1,100	16	Schblr..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm..	Timkn.	8.75	r-rd....	spgs...	Mthr...	int-r-w.	int-r-w.	l....	Ross..	c....	metl...	Spicer*.	Armleder.....HW
1,100	14	Schblr..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm..	Timkn.	8.75	r-rd....	spgs...	Mthr...	int-d-s..	int-r-w.	l....	Ross..	c....	metl...	Spicer*.	Armleder.....KW
1,800	30	Carter..	grav..	d-d...	B-Beck.	selec...	own....	mtr...	3	bevl...	Hess....	.....	spgs...	spgs...	Rowl...	ext-r-w.	int-r-w.	l....	Lavn..	c....	metl...	Arvac..	Atlas.....19
1,200	15	Zenith..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	4	worm..	Timkn.	8.5	spgs...	spgs...	S-P....	int-r-w.	int-r-w.	r....	Gem..	r....	metl...	Spicer..	Atterbury.....7R
1,200	15	Zenith..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	4	worm..	Timkn.	8.5	spgs...	spgs...	S-P....	int-r-w.	int-r-w.	r....	Gem..	r....	metl...	Spicer..	Atterbury.....7C
1,125	13	Zenith..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	4	worm..	Timkn.	10.33	spgs...	spgs...	S-P....	int-r-w.	int-r-w.	r....	Gem..	r....	metl...	Spicer..	Atterbury.....7D
1,000	10.5	Zenith..	vacm..	d-p...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm..	Timkn.	11.6	r-rd....	tor-a...	Perf...	int-r-w.	int-r-w.	l....	Gem..	c....	metl...	Spicer..	Atterbury.....8E
.....	.....	Stmbg..	grav..	d-p...	own....	prog....	own....	amid..	3	d-rd...	own....	.....	spgs...	spgs...	.....	ext-r-w.	int-r-w.	r....	own..	r....	metl...	.....	Autocar.....XXI-F
1,200	15	Stmbg..	grav..	d-p...	B-Beck.	selec...	Dtrt...	amid..	3	in-g...	own....	11.4	tor-a...	spgs...	Champ.	ext-dst.	int-f-w.	c....	own..	r....	metl...	own....	Autehorse.....16
.....	.....	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm..	Timkn.	7.0	r-rd....	spgs...	Tut....	int-r-w.	int-r-w.	l....	Ross..	c....	metl...	Spicer..	Availab.e.....1
1,100	15	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	3	worm..	Timkn.	7.75	r-rd....	spgs...	Tut....	int-r-w.	int-r-w.	l....	Lavn..	c....	metl...	Spicer..	Availab e.....2
1,100	13	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm..	Timkn.	10.3	r-rd....	spgs...	Tut....	int-r-w.	int-r-w.	l....	Lavn..	c....	metl...	Spicer..	Availab e.....3
1,175	12	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm..	Timkn.	11.7	r-rd....	spgs...	Tut....	int-r-w.	int-r-w.	l....	Ross..	c....	metl...	Spicer..	Availablle.....8
1,500	.....	Stmbg..	grav..	d-d...	Fuller..	prog....	Fuller..	mtr...	3	in-g...	Clark..	3	spgs...	.....	Hig....	int-r-w.	ext-r-w.	l....	Lavn..	c....	metl...	Blood..	Beck.....A
1,500	.....	Stmbg..	.....	d-d...	Fuller..	prog....	Fuller..	mtr...	3	in-g...	Clark..	6	spgs...	.....	.....	int-r-w.	int-r-w.	l....	Lavn..	c....	metl...	Blood..	Beck.....B
1,200	.....	Stmbg..	grav..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	in-g...	Clark..	9	spgs...	spgs...	Hig....	ext-r-w.	int-r-w.	l....	Lavn..	c....	metl...	Blood..	Beck.....C
1,000	12	King...	vacm..	d-p...	B-Beck.	selec...	own....	amid..	6	bevl-4.	own....	8	r-rd....	spgs...	.....	ext-d-s.	ext-r-w.	.....	own....	.....	.....	.....	Beech Creek.....3A
1,550	22½	Zenith..	grav..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	in-g...	Torb...	7	spgs...	spgs...	Perf...	ext-r-w.	int-r-w.	l....	Ross..	c....	metl...	Arvac..	Bessemer.....G
1,340	18	Zenith..	grav..	d-p...	B-Beck.	prog....	B-Lipe.	amid..	3	in-g...	Torb...	8	spgs...	spgs...	Perf...	ext-r-w.	int-r-w.	l....	Ross..	c....	metl...	Arvac..	Bessemer.....H
1,000	13	Rayfld.	grav..	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	in-g...	Torb...	8	spgs...	spgs...	Perf...	ext-r-w.	int-r-w.	l....	Ross..	c....	metl...	Arvac..	Bessemer.....J
1,200	12	Rayfld.	grav..	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	in-g...	Torb...	10.25	r-rd....	spgs...	Perf...	int-r-w.	ext-d-s.	l....	Ross..	c....	metl...	.....	Bessemer.....K
1,358	18	Schblr..	grav..	d-p...	B-Beck.	selec...	Dtrt...	mtr...	3	in-g...	Russl..	7.7	spgs...	spgs...	Shel...	ext-r-w.	int-r-w.	l....	Lavn..	c....	metl...	Univ..	Bethlehem.....D
1,303	15	Schblr..	grav..	d-p...	B-Beck.	selec...	Dtrt...	mtr...	3	in-g...	Russl..	8.2	spgs...	spgs...	Shel...	ext-r-w.	int-r-w.	l....	Lavn..	c....	metl...	Univ..	Bethlehem.....E
1,113	12	Schlbr..	grav..	d-p...	B-Beck.	selec...	Dtrt...	mtr...	3	in-g...	Russl..	9.4	spgs...	spgs...	Shel...	ext-r-w.	int-r-w.	l....	Lavn..	c....	metl...	Univ..	Bethlehem.....F
1,280	15	Zenith..	grav..	.....	Ents...	.....	Ents...	mtr...	.....	worm..	Timkn.	8.5	r-rd....	spgs...	Mthr...	int-r-w.	int-r-w.	.....	Ross..	.....	metl...	Blood..	Bourne.....VM
1,100	12	Zenith..	grav..	.....	Entz...	.....	Entz...	mtr...	.....	worm..	Timkn.	10.3	r-rd....	spgs...	Mthr...	int-r-w.	int-r-w.	.....	Ross..	.....	.....	Blood..	Bourne.....XM
.....	.....	.....	pres..	d-d...	.....	selec...	.....	mtr...	3	worm..	.....	6.2	spgs...	spgs...	.....	int-r-w.	int-4-w.	l....	.....	e....	.....	.....	.....	Brinton.....H
.....	.....	.....	grav..	d-d...	.....	selec...	.....	mtr...	3	worm..	.....	7.75	spgs...	spgs...	.....	int-r-w.	int-r-w.	l....	.....	e....	.....	.....	.....	Brinton.....F
.....	.....	Buick..	grav..	cone..	own...	prog....	own...	r-ax..	3	bevl...	own....	4.23	tor-a...	tor-a...	Alloy...	ext-r-w.	int-r-w.	l....	own..	l&c..	metl...	own...	Briscoe.....4-24
.....	25	Buick..	grav..	cone..	own...	prog....	own...	mtr...	3	in-g...	Russl..	8.2	spgs...	spgs...	Alloy...	ext-r-w.	int-r-w.	l....	.....	l&c..	metl...	Univ..	Briscoe.....T-34
.....	.....	Schblr..	grav..	cone..	Hart...	selec...	B-Lipe.	amid..	3	worm..	Timkn.	8.5	spgs...	spgs...	Merl...	int-r-w.	int-r-w.	l....	Gem..	c....	metl...	Spicer..	Brockway.....J2
.....	.....	Schblr..	grav..	cone..	Hart...	selec...	B-Lipe.	amid..	3	worm..	Timkn.	8.5	r-rd....	spgs...	Merl...	int-r-w.	int-r-w.	l....	Gem..	c....	metl...	Spicer..	Brockway.....K3
.....	.....	Schblr..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	3	worm..	Timkn.	10.33	r-rd....	spgs...	Merl...	int-r-w.	int-r-w.	l....	Gem..	c....	metl...	Spicer..	Brockway.....R
1,200	18	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm..	Shel...	7.2	spgs...	spgs...	Perf...	int-r-w.	int-r-w.	.....	Lavn..	.....	.....	.....	Chase.....A
1,000	16	Stmbg..	grav..	d-p...	B-Beck.	selec...	Cotta..	mtr...	3	worm..	Shel...	8.6	spgs...	spgs...	Perf...	ext-r-w.	int-r-w.	.....	Lavn..	.....	.....	.....	Chase.....C
1,000	14	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm..	Shel...	8.66	spgs...	spgs...	Perf...	ext-r-w.	int-r-w.	.....	Lavn..	.....	.....	.....	Chase.....B
1,000	12	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm..	Salsby..	9.25	spgs...	spgs...	Perf...	int-r-w.	int-r-w.	.....	Lavn..	.....	.....	.....	Chase.....X
1,000	12	Stmbg..	grav..	w-d...	B-Lipe.	selec...	B-Lipe.	mtr...	4	worm..	Shel...	8.75	spgs...	tor-a...	Perf...	ext-r-w.	ext-r-w.	.....	Lavn..	.....	.....	.....	Chase.....O
1,000	25	Zenith..	grav..	cone..	own...	selec...	Warner	mtr...	3	worm..	Ind....	4	spgs...	spgs...	Perf...	int-r-w.	int-r-w.	l....	Warn..	r....	metl...	Arvac..	Chevrolet.....T

ABBREVIATIONS—Makers of Parts

*Other Options
A-K—Atwater-Kent
Al-Ch—Allis-Chalmers
Aut-L—Auto-Lite
B-Beck—Borg & Beck
B-Lipe—Brown-Lipe
Blng—Berling
Brem—Bremer
Can—Candler
Cant—Canton-Cleveland
CAS—C.A.S.Products Co.
Champ—Champion Spng
Chcgo—Chicago-Stndrd.
Chgo—Chicago Mfg. Co.
Con—Continental
Conn—Connecticut
Cover—Covert
Del—Delany
Ditw—Ditweiler
Dneto—Dyneto
Dtrt—Detroit Press. Stl.
Dtrt—Detroit Lubricat.
Dtrt—Detroit G. & M. Co.
Dtrt—Detroit Stl. Spng.
Duplx—Duplex
E&M—English & Mersick
Eismn—Eisemann
Emp—Empire
Ens—Ensign
Eur—Eureka
Fed—Fedders
Flech—Fletcher
Fost—Foster
Franck—Francke
G&D—Gray & Davis
G&O—G. & O. Mfg. Co.
GBS—Golden, Belknap & Swartz
G-Lees—Grant-Lees
Gem—Gemmer
H&N—H. & N. Carburetor Co.
Har—Harrison
Hart—Hartford
Hays—Hayes
Her—Hercules
Hig—Higgins
Hol—Holley
H-Shaw—Hele-Shaw
H-S—Herschell-Spillman
Hyd—Hydraulic
Idl—Ideal
Ind—Industrial Eqpt. Co.
Iron—Iron City
J-A—Jackson Radiator Wks.
Jacox—Jackson-Church-Wilcox
Jas—Jamestown Car Pts. Co.
Jhnson—Johnson
Kal—Kalamazoo
K-B—Kinsler-Bennett
Key-H—Keystone-Hindley
King—Kingston
Koko—Kokomo
Lau—Lauraine
Lavn—Lavine
LeR—LeRoi
Lgt—Light Foundry
Ligt—Liggett
L-N—Leece Neville
Lyc—Lycoming
Marvl—Marvel
Mast—Master
McC—McCord
McFar—McFarland
Mech—Mechanics
Merl—Merrill
Mil—Milwaukee
Mnrch—Monarch
Mod—Modine
Mthr—Mather
M&E—Merchant & Evans
Natl—National
N.A.—North American
N-E—North East
Nlite—Nicolite
Penn—Penn Spring Co.
P&B—Parish & Bingham
Per—Perfex
Perf—Perfection
Prsh—Parish
R-T—Rome-Turney
Rayfld—Rayfield
Rem—Remy
Rowl—Wm. Harvel Rowland
Rugles—Ruggles
Russl—Russel
Rut—Rutenber
Savg—Savage Arms
Salsby—Salisbury
Schblr—Schebler
Shel—Sheldon
Shkspr—Shakespeare
Smth—A. O. Smith
S-P—Spring-Perch
Spltf—Splitdorf
Stan—Standard Radiator Co.
Stand—Standard Steel Spring Co.
Stewrt—Stewart
Stlg—Sterling
Stmbg—Stromberg
Sundmn—Sunderman
S-W—Sparks-Withington
Therm—Thermoid
Timkn—Timken
Titsn—Tillotson
Torbn—Torbenson
Tut—Tuthill
Univ—Universal Machine Co.
Wau—Waukesha
West—Westinghouse
Wis—Wisconsin
Wol—Wohlrab
W-W—Walker-Weise

Detailed Technical Specifications of

Name and Model	Tons Capacity	Chassis Price	Wheelbase Inches	FRAME Make	FRAME Material	FRAME Type	TIRES Size in Ins. Kind	TIRES Front	TIRES Rear	Wheels	ENGINE Make	ENGINE No. Cyl., Bore and Stroke — N.A.C.C. Hp.	ENGINE Cylinders Cast	COOLING Water Circ.	COOLING Radiator Make	COOLING Radiator Core and Case	IGNITION Type	IGNITION Make	IGNITION Spark Advance	ELEC. SYSTEM Type	ELEC. SYSTEM Make	ELEC. SYSTEM Extra Cost, $	GOVERNOR Type	GOVERNOR Make	GOVERNOR Drive
Clydesdale 65	2	.....	163	P&B	p-stl	s-flex	s	36x4	36x4d	wd	Con	4-4½x5½-27.2	4	cent	own	p-t-c-a	sing	Bosch	hand	.....	.....	.....	cent	own	motor
Clydesdale 90	3½	.....	180	P&B	p-stl	s-flex	s	36x5	40x5d	wd	Con	4-4½x5½-32.4	2	cent	own	p-t-c-a	sing	Bosch	hand	.....	.....	.....	cent	own	motor
Clydesdale 120B	5	.....	204	P&B	p-stl	s-flex	s	36x5	40x6d	c-s	Con	4-4½x6 -36.1	2	cent	own	p-t-c-a	sing	Bosch	hand	.....	.....	.....	cent	own	motor
Collier 16	1½	$1,375	128	P&B	p-stl	s-flex	pnu	33x4½	33x4½	wd	Lyc	4-3½x5 -19.6	4	ther	Jas	zz-t-pst	sing	Conn	hand	sl&i2	Aut-L	.....	.....	.....	none
Columbia E	2	2,350	144	own	rol-c	flex	s	36x4	36x6	wd	Con	4-4½x5½-27.2	4	cent	Long	fin-cst	sing	Splf	hand	ltg	Vesta	75	cent	Pierce	motor
Columbia T	6	2,350	112	own	rol-c	flex	s	36x4	36x6	wd	Con	4-4½x5½-27.2	4	cent	Long	fin-cst	sing	Splf	hand	ltg	Vesta	75	cent	Pierce	motor
Comet	1½	1,575	130	.....	.....	.....	s	34x4	34x4	....	Lyc	4-3½x5 -19.6	....	ther	.....	.....	.....	Delco	.....	stg	Dneto	.....	.....	.....	.....
Commerce E	1	1,500	126	Dtrt	p-stl	flex	s	34x3	34x4	wd	Con	4-3½x5 -22.5	4	ther	Long	fin-cst	sing	Spltf	fix	s&l2	Bijur	.....	cent	Pierce	d-s
Concord A	1½	2,450	140	P&B	p-stl	s-flex	s	36x3½	36x5	wd	Buda	4-3½x5½-22.5	4	cent	Bush	fin-cst	sing	Eismn	hand	.....	.....	.....	suc	Mnrch	motor
Concord B	2½	2,850	150	P&B	p-stl	s-flex	s	36x4	36x4d	wd	Buda	4-4¼x5½-29.0	4	cent	Bush	fin-cst	sing	Eismn	hand	.....	.....	.....	suc	Mnrch	motor
Corbitt E	1	2,000	130	.....	p-stl	flex	opt	34x3½	34x4	wd	Con	4-3½x5 -22.5	4	ther	Idl	cel-sht	sing	Eismn	hand	sl&i2	Disco	100	cent	Pierce	motor
Corbitt D	1½	2,400	138	.....	p-stl	flex	opt	36x3½	36x5	wd	Con	4-3½x5 -22.5	4	ther	Idl	cel-sht	sing	Eismn	hand	sl&i2	Disco	100	cent	Pierce	motor
Corbitt C	2	3,000	148	.....	p-stl	flex	s	36x4	36x7	wd	Con	4-4½x5½-27.2	4	cent	R-T	fin-cst	sing	Eismn	hand	none	none	.....	cent	Pierce	motor
Corbitt B	2½	3,200	148	.....	p-stl	flex	s	36x4	36x7	wd	Con	4-4½x5½-27.2	4	cent	R-T	fin-cst	sing	Eismn	hand	none	none	.....	cent	Pierce	motor
Corbitt A	3½	4,000	168	.....	rol-c	rigid	s	36x5	36x5d	wd	Con	4-4½x5½-32.4	2	cent	R-T	fin-cst	sing	Eismn	hand	none	none	.....	cent	Pierce	motor
Corbitt AA	5	4,500	168	.....	rol-c	rigid	s	36x6	40x6d	c-s	Con	4-4½x6 -32.4	2	cent	R-T	fin-cst	sing	Eismn	hand	none	none	.....	cent	Pierce	motor
Corliss A	½	800*	100	.....	p-stl	rigid	pnu	31x4	31x4	wd	Mil	4-3½x4½-15.6	4	ther	.....	fin-sht	sing	Spltf	hand	.....	.....	.....	.....	.....	.....
Couple-Gear HC	3½	6,000	144	.....	.....	.....	s	36x4d	36x4d	....	Con	4-4½x6 -36.1	1	.....	.....	.....	dual	Eismn	fix	ltg	.....	.....	.....	.....	.....
Couple-Gear AC	5	6,600	144*	.....	.....	.....	s	36x5d	36x5d	....	Wis	4-5½x7 -44.1	1	.....	.....	.....	dual	Eismn	fix	ltg	.....	.....	cent	.....	f-whl
Croce 17	½	825	108	.....	p-stl	.....	p&s	32x4	32x4	....	Wis	4-3½x5 -16.9	4	.....	.....	.....	sing	Bosch	fix	.....	.....	.....	.....	.....	.....
Dart E	1	2,100	130	Savg	p-stl	s-flex	s	34x3½	34x5	wd	Buda	4-3½x5½-19.6	4	ther	Idl	cel-sht	sing	Eismn	hand	s&l	Bijur	200	none	none	.....
Dart CC4	2	2,950	150	Savg	p-stl	s-flex	s	36x4	36x7	wd	Buda	4-4½x5½-29.0	4	cent	Idl	cel-cst	sing	Eismn	hand	s&l	Bijur	200	cent	Pierce	motor
Dart L	3½	4,000	160	.....	rol-c	rigid	s	36x5	36x10	wd	Buda	4-4½x6 -32.4	4	cent	Per	cel-c-a	sing	Eismn	hand	s&l	Bijur	200	cent	Pierce	motor
D-E J	½	1,050	108	Prsh	p-stl	s-flex	pnu	33x4	33x4	wd	L-R	4-3½x4½-15.6	4	ther	Bush	fin-sht	sing	Blng	hand	s&l	Al-Ch	.....	.....	.....	.....
D-E A	1	1,775	128	Savg	p-stl	s-flex	s	34x3	34x4	wd	Con	4-3½x5 -19.6	4	ther	Bush	fin-cst	sing	Blng	fix	.....	.....	.....	suc	Mnrch	motor
D-E B	1½	2,075	144	Savg	p-stl	s-flex	s	34x3½	34x5	wd	Con	4-3½x5 -22.5	4	ther	Bush	fin-cst	sing	Blng	fix	.....	.....	.....	suc	Mnrch	motor
D-E D	2	2,150	128	Savg	p-stl	s-flex	s	34x4	34x6	wd	Con	4-3½x5 -22.5	4	ther	Bush	fin-cst	sing	Blng	fix	.....	.....	.....	suc	Mnrch	motor
D-E C	2½	2,750	150	Savg	p-stl	s-flex	s	36x4	36x7	wd	Buda	4-4½x5½-29.0	4	cent	Bush	fin-cst	sing	Blng	fix	.....	.....	.....	suc	Mnrch	motor
D-E E	5	4,500	170	Savg	p-stl	rigid	s	36x5	40x6d	wd	Buda	4-4½x6 -32.4	4	cent	Bush	fin-cst	sing	Blng	fix	.....	.....	.....	suc	Mnrch	motor
Defiance B	1½	1,795	135	Dtrt	p-stl	s-flex	s	34x3½	34x5	wd	Con	4-3½x5 -22.5	4	ther	Perf	cel-cst	sing	Eismn	hand	ltg	Delco	150	suc	Mnrch	motor
DeKalb E-2	2	2,100	134	Prsh	p-stl	rigid	s	34x3½	36x5	wd	Con	4-4½x5½-27.2	4	cent	J-A	cel-pst	sing	Eismn	hand	none	none	none	none	none	none
DeKalb E-2½	2½	2,600	136	Prsh	p-stl	rigid	s	36x4	36x6	wd	Con	4-4½x5½-32.4	4	cent	J-A	cel-pst	sing	Eismn	fix	none	none	none	none	none	none
Denby 12	1	1,650	124	Dtrt	p-stl	s-flex	s	34x3	34x4	wd	Con	4-3½x5 -19.6	4	ther	Long	fin-cst	sing	Eismn	fix	sl&i2	Bijur	150	suc	Mnrch	motor
Denby 13	2	2,350	144	Dtrt	p-stl	s-flex	s	36x3½	36x6	wd	Con	4-3½x5 -22.5	4	ther	Long	fin-cst	sing	Eismn	fix	sl&i-2	Bijur	150	suc	Mnrch	motor
Denby 15	3	2,775	144	Dtrt	p-stl	s-flex	s	36x4	36x7	c-s	Con	4-3½x5 -22.5	4	ther	Long	fin-cst	sing	Eismn	fix	sl&i-2	Bijur	150	suc	Mnrch	motor
Denby 210	5	4,900	170	Dtrt	p-stl	s-flex	s	36x6	40x12	c-s	Con	4-4½x5½-32.4	2	cent	Long	fin-cst	sing	Eismn	hand	.....	.....	.....	cent	Duplx	motor
Diamond-T J5	1	2,125	132	Smth	p-stl	flex	s	36x3	36x4	wd	Con	4-3½x5 -19.6	4	ther	G&O	fin-cst	sing	Bosch	fix	none	none	none	cent	Pierce	motor
Diamond-T J4	1½	2,550	154	Smth	p-stl	flex	s	36x3½	36x5	wd	Con	4-3½x5 -22.5	4	ther	G&O	fin-cst	sing	Bosch	fix	none	none	none	cent	Pierce	motor
Diamond-T J3	2	2,925	154	Smth	p-stl	flex	s	36x4	36x7*	wd	Con	4-4½x5½-27.2	4	ther	G&O	fin-cst	sing	.....	fix	none	none	none	cent	Pierce	motor
Diamond-T LB	3½	4,150	170	Smth	p-stl	flex	s	36x5	36x5d	wd	Con	4-4½x5½-32.4	4	ther	G&O	fin-cst	sing	.....	hand	none	none	none	cent	Pierce	motor
Diamond-T R	5	4,950	170	Smth	p-stl	flex	s	36x6	40x6d	wd	Con	4-4½x5½-32.4	4	ther	G&O	fin-cst	sing	.....	fix	none	none	none	cent	Pierce	motor
Doane 1919	6	5,650	178	.....	rol-c*	.....	s	36x6	40x6d	wd*	Wau	4-4½x6½-36.1	2	cent	own	cel-cst	sing	Bosch	auto	none	none	none	cent	Wau	motor
Dorris K4	2	2,985	162	own	p-stl	flex	s	36x4	36x7	wd	own	4-4½x5½-29.0	4	cent	own	fin-cst	sing	Bosch	hand	s&l2	West	175	cent	own	motor
Douglas TA	1½	2,000	127	own	rol-c	rigid	s*	34x3½	34x5	wd	Buda	4-4½x5 -27.2	4	cent	Mayo	fin-cst	sing	Eismn	hand	ltg	Aut-L	none	cent	Pierce	motor
Duplex E	3½	4,000	130	P&B	p-stl	rigid	s	36x6	36x6	wd	Buda	4-4½x5½-29.0	4	cent	Long	fin-cst	sing	Eismn	hand	.....	opt	....	cent	Duplx	motor
Ellsworth 25A	½	855*	108	P&B	p-stl	flex	pnu	30x3½	30x3½	wd	Lyc	4-3½x5 -16.9	4	ther	Can	cel	sing	.....	hand	sl&i-2	Dneto	....	none	none	none
Fageol 2	2	3,300	144	.....	.....	.....	s	34x4	36x7	....	Wau	4-4 x5½-25.6	2	.....	.....	.....	sing	Dixie	fix	.....	.....	.....	cent	Wau	motor
Fargo P	2	2,200	144	own	rol-c	s-flex	s	36x4	36x6	wd	Con	4-3½x5 -22.5	4	ther	own	fin-cst	sing	Bosch	hand	none	none	none	suc	Mnrch	motor
Federal S	1	1,900	132	Dtrt	p-stl	s-flex	opt	34x3	34x4	wd	.....	4-3½x5½-22.5	4	cent	MeC	fin-pst	sing	Eismn	fix	opt	opt	....	suc	Mnrch	motor
Federal T	1½	2,350	144	Dtrt	p-stl	s-flex	s	36x3½	36x5	wd	Con	4-4½x5½-27.2	4	cent	MeC	fin-pst	sing	Eismn	fix	opt	opt	....	suc	Mnrch	motor
Federal U	2	2,600	144	Dtrt	p-stl	s-flex	s	36x4	36x7	wd	Con	4-4½x5½-27.2	4	cent	MeC	fin-pst	sing	Eismn	fix	opt	opt	....	suc	Mnrch	motor
Federal W	3½	3,350	156	.....	rol-c	s-flex	s	36x5	36x5d	c-s	Con	4-4½x5½-32.4	2	cent	MeC	fin-pst	sing	Eismn	fix	opt	opt	....	suc	Mnrch	motor
Federal X	5	4,400	156	.....	rol-c	s-flex	s	36x6	40x6d	c-s	Con	4-4½x5½-32.4	2	cent	MeC	fin-pst	sing	Eismn	fix	opt	opt	....	suc	Mnrch	motor
Forschler ¾	¾	1,535	120	.....	.....	.....	s	32x2½	32x3	....	LeR	4-3½x4½-15.6	4	.....	.....	.....	sing	Dixie	fix	.....	.....	.....	suc	Mnrch	motor
Forschler 1	1	2,000	130	.....	.....	.....	s*	34x3	34x4	....	Con	4-3½x5 -19.6	4	.....	.....	.....	sing	Bosch	fix	.....	.....	.....	suc	Mnrch	motor
Forschler 1½	1½	2,375	138	.....	.....	.....	s	34x3½	34x5	....	Con	4-3½x5 -19.6	4	.....	.....	.....	sing	Bosch	fix	.....	.....	.....	suc	Mnrch	motor
Forschler 2	2	2,750	140*	.....	.....	.....	s*	34x4	34x6	....	Con	4-4½x5½-27.2	4	.....	.....	.....	sing	Bosch	fix	.....	.....	.....	cent	Pierce	motor
Ford TT	1	550	124	P&B	p-stl	flex	p&s	30x3½	32x3½	wd	own	4-3½x4 -22.5	4	ther	own	fin-sht	sing	own	hand	ltg	.....	.....	.....	.....	.....
F.W.D B	3	4,600	124	Prsh	rol-c	s-flex	s	36x6	36x6	wd	Wis	4-4½x5½-36.1	2	cent	Long	fin-cst	sing	Eismn	hand	.....	.....	.....	cent	Pierce	motor
Fulton FX	1½	1,850	136	P&B	p-stl	flex	s	34x3	34x5	wd	H-S	4-3⅜x5⅞-18.2	4	ther	G&O	zz-t-cst	sing	Simms	hand	opt	Bijur	.....	cent	Pierce	gset
Gabriel C	1	2,000	136	Prsh	p-stl	s-flex	pnu	35x5	35x5	wd	Buda	4-4¼x5½-29.0	4	cent	G&O	cel-cst	sing	Bosch	hand	s&l2	L-N	150	none	none	none
Gabriel E	2	3,250	156	Prsh	p-stl	s-flex	opt	36x4	36x7	wd	Buda	4-4¼x5½-29.0	4	cent	G&O	cel-cst	sing	Bosch	hand	s&l2	L-N	150	cent	Duplx	motor
Gabriel F	4	4,300	180	Prsh	p-stl	s-flex	s	36x5	40x6d	c-s	Buda	4-4¼x6 -32.4	4	cent	G&O	cel-cst	sing	Bosch	hand	s&l2	L-N	150	cent	Duplx	motor
Garford 75-C	1	2,500	128	own	p-stl	s-flex	p&s	34x4½	36x4	wd	Buda	4-3½x5½-22.5	4	cent	own	fin-cst	sing	Spltf	hand	s&l	West	175	cent	Duplx	motor

ABBREVIATIONS—Types of Construction

*Other Options
amid—amidships
auto—automatic
bevl—bevel
c—center
c&l—center and left
c&s—cushion and solid
cent—centrifugal
c-s—cast steel
c-a—cast aluminum
cel-cst—cellular core, cast case
cel-pst—cellular core, pressed steel case
cel-sht—cellular core, sheet case
chn—chain
cylinders cast, 2 in pairs
cylinders cast, 4 in block
cylinders cast, 3 in threes
cylinders cast, 1 singly
d-d—dry disk
d-p—dry plate
d-rd—double reduction
d-s—driveshaft
elec—electric
ext-d-s—external driveshaft
ext-f-w—external front wheels
ext-g—external gear
ext-jst—external jackshaft
ext-r-w—external rear wheel
fab—fabric
fin—finned tube
fin-c-a—finned tube core, cast aluminum case
fin-cst—finned tube core, cast case
fin-pst—finned tube core, pressed steel case
fin-sht—finned tube core, sheet case
fix—fixed
flex—flexible
fric—friction
g.p.—gear pump
grav—gravity
gset—gearset
hyd—hydraulic
ind-c—individual clutch
int-d-s—internal drive-shaft
int-f-w—internal front wheels
in-g—internal gear
in-g-4—internal gear drive on 4 wheels
int-r-w—internal rear wheel
jst—unit with jackshaft
l—left
l&c—left and center
leat—leather
l-b—loose ball
ltg—lighting
metl—metal
mtr—unit with motor
opt—optional
p—plate in oil
pist—piston pump
plan—planetary
pnu—pneumatic
pres—pressure
prog—progressive sliding gearset
p-t-c-a—plain tube core, cast aluminum case
p-t-cst—plain tube core, cast case
p-stl—pressed steel
p&s—pneumatic and solid
r—right
r-ax—unit with rear axle
rng-cst—ring core, cast case
rol-c—rolled channel
rol-i—rolled I-beam
r-rd—radius rods
selec—selective sliding gear
s-flex—semi-flexible
stg—starting
s&l—starting and lighting
s,l&i—starting, lighting and ignition
s l&i2—starting, lighting and ignition, two-unit
sing—single
s—solid
s&c—solid and cushion
spgs—springs
sq-t-cst—square tube core, cast iron
sq-t-sht—square tube core sheet case
stk—stock
sub-f—sub-frame
suc—suction
s-bev—spiral bevel
ther—thermo-syphon
tor-a—torque arm
t-t—torsion tube
unt-x—unit with axle
vacm—vacuum
wd—wood
w-d—multiple disk in oil
worm—top worm
w-p—wet plate
zz-t-cst—zig zag tube core, cast case
zz-t-pst—zig zag tube core, pressed steel case
zz-t-sht—zig-zag tube core, sheet case

Gasoline Motor Trucks for 1919—Continued

ENGINE						TRANSMISSION										BRAKES		CONTROL			UNIVERSALS		
SPEED		FUEL SYS.		CLUTCH		GEARSET				FINAL DRIVE								STEERING GEAR					
Motor in R.p.m.	Truck in M.p.h.	Carbureter Make	Fuel Feed	Type	Make	Type	Make	Placed	Speeds	Type	Axle Make	Total Gear Reduction	Propulsion Taken By	Torque Taken By	Springs Make	Foot	Hand	Placed	Make	Levers	Type	Make	Name and Model
1,125	14	Zenith..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm	Timkn.	8.5	r-rd....	spgs...	Perf...	int-r-w.	int-r-w.	r....	Ross..	r....	metl...	Spicer..	Clydesdale.....65
1,175	12	Zenith..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm	Timkn.	10.33	r-rd....	spgs...	Perf...	int-r-w.	int-r-w.	r....	Ross..	r....	metl...	Spicer..	Clydesdale.....90
1,000	10	Zenith..	vacm..	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm	Timkn.	11.66	r-rd....	spgs...	Perf...	int-r-w.	int-r-w.	l....	Ross..	c....	metl...	Spicer..	Clydesdale.....120B
.....	.....	Zenith..	.....	d-p...	B-Beck.	selec...	G-Lees.	mtr...	3	worm	Chego..	6	tor-a...	tor-a...	Stlg...	ext-r-w.	int-r-w.	l....	Ditw..	.....	.....	.....	Collier.....16
1,200	15	Shkspr.	grav..	cone..	Hart...	selec...	Covert.	amid..	3	in-g...	Russl..	9.4	spgs...	spgs...	Perf...	ext-r-w.	int-r-w.	l....	own...	c....	metl...	Spicer..	Columbia.....E
1,200	15	Shkspr.	grav..	cone..	Hart...	selec...	Covert.	amid..	3	in-g...	Russl..	9.4	spgs...	spgs...	Perf...	ext-r-w.	int-r-w.	l....	own...	c....	metl...	Spicer..	Columbia.....T
2.000	20	Carter.	grav..	d-p...	B-Beck.	selec...	Muncie	mtr...	3	worm	Chego..	7.75	spgs...	tor-a...	.....	int-r-w.	int-r-w.	l....	CAS..	c....	metl...	Univ..	Comet.....
2,200	20	Zenith..	vacm..	cone..	Dtrt...	selec...	Dtrt...	mtr...	3	in-g...	Torbn..	7	spgs...	spgs...	Dtrt...	ext-r-w.	int-r-w.	l....	Jacx..	c....	metl...	Spicer..	Commerce.....E
1,170	18	Zenith..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm	Timkn.	7.75	spgs...	spgs...	Perf...	int-r-w.	int-r-w.	l....	Ross..	c....	metl...	Spicer..	Concord.....A
1,266	16	Zenith..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm	Timkn.	8.5	spgs...	spgs...	Perf...	int-r-w.	int-r-w.	l....	Ross..	c....	metl...	Spicer..	Concord.....B
1,080	18	Stmbg..	grav..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	worm	Shel...	6.5	spgs...	spgs...	Shel...	int-r-w.	int-r-w.	l....	Lavn..	c....	.....	.....	Corbitt.....E
1,200	16	Stmbg..	grav..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	worm	Shel...	7.5	spgs...	spgs...	Shel...	ext-r-w.	int-r-w.	l....	Ross..	c....	.....	.....	Corbitt.....D
1,075	14	Stmbg..	vacm..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm	Shel...	8.66	spgs...	spgs...	Shel...	int-r-w.	int-r-w.	l....	Ross..	c....	.....	.....	Corbitt.....C
1,290	14	Stmbg..	vacm..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	4	worm	Shel...	8.66	spgs...	spgs...	Shel...	int-r-w.	int-r-w.	l....	Ross..	.....	.....	.....	Corbitt.....B
1,250	12	Stmbg..	.....	w-d...	H-Shaw	ind-c...	Cotta..	amid..	3	worm	Shel...	8.75	spgs...	spgs...	Shel...	int-r-w.	int-r-w.	l....	Ross..	c....	.....	.....	Corbitt.....A
1,000	10	Stmbg..	vacm..	w-d...	H-Shaw	ind-c...	Cotta..	amid..	3	worm	Shel...	8.75	r-rd....	tor-a...	Shel...	int-r-w.	int-r-w.	l....	Ross..	c....	.....	.....	Corbitt.....AA
.....	.....	Schblr..	grav..	d-d...	.....	.....	.....	mtr...	3	bevl...	.....	4.5	tor-t...	tor-t...	.....	int-r-w.	int-r-w.	.....	.....	.....	.....	.....	Corliss.....A
1,500	10	Stmbg..	grav..	.....	.....	elec...	.....	.....	1	bevl-4.	own...	25	r-rd....	r-rd....	Tut.....	ext-4-w.	.....	.....	own...	.....	.....	.....	Couple-Gear.....HC
1,500	10	Stmbg..	grav..	.....	.....	elec...	.....	amid..	1	bevl-4.	own...	25	r-rd....	r-rd....	Tut....	ext-4-w.	.....	.....	own...	.....	.....	.....	Couple-Gear.....AC
1,000	17½	Zenith..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	bevl...	Timkn.	5.	spgs...	spgs...	.....	ext-r-w.	int.....	.....	Lavn..	.....	.....	.....	Croce.....17
.....	.....	Zenith..	vacm..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	worm	Timkn.	7	spgs...	spgs...	Perf...	int-r-w.	int-r-w.	l....	Ross..	c....	metl...	Arvac..	Dart.....E
1,100	12	Zenith..	grav..	d-d...	Fuller..	selec...	Fuller..	mtr...	4	worm	Timkn.	8.5	spgs...	spgs...	Perf...	int-r-w.	int-r-w.	l....	Ross..	c....	metl...	Spicer.	Dart.....CC4
1,100	14	Zenith..	grav..	d-d...	Fuller..	selec...	Fuller..	amid..	4	worm	Timkn.	10.75	spgs...	spgs...	Perf...	int-r-w.	int-r-w.	l....	Ross..	c....	metl...	Spicer.	Dart.....L
1,560	25	Schblr..	grav..	w-d...	Dtrt...	selec...	Dtrt...	mtr...	3	worm	Shel...	6.2	spgs...	spgs...	Iron...	int-r-w.	int-r-w.	l....	Gem...	c....	metl...	Hart...	D-E.....J
1,280	16	Zenith..	grav..	d-p...	B-Beck.	selec...	Covert.	mtr...	3	worm	Hays..	7.77	spgs...	spgs...	Iron...	int-r-w.	int-r-w.	l....	Ross..	c....	metl...	Hart...	D-E.....A
1,290	15	Zenith..	grav..	d-p...	B-Beck.	selec...	Covert.	mtr...	3	worm	Hays..	8.33	spgs...	spgs...	Iron...	int-r-w.	int-r-w.	l....	Ross..	c....	metl...	Hart...	D-E.....B
1,290	15	Zenith..	grav..	d-p...	B-Beck.	selec...	Covert.	mtr...	3	worm	Hays..	8.33	spgs...	spgs...	Iron...	int-r-w.	int-r-w.	l....	Ross..	c....	metl...	Hart...	D-E.....D
1,100	14	Zenith..	grav..	d-p...	B-Beck.	selec...	Covert.	mtr...	3	worm	Hays..	8.66	spgs...	spgs...	Iron...	int-r-w.	int-r-w.	l....	Ross..	c....	metl...	Hart...	D-E.....C
1,000	12	Zenith..	grav..	w-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm	Shel...	8.7	spgs...	spgs...	Shel...	int-r-w.	int-r-w.	l....	Ross..	c....	metl...	Hart...	D-E.....E
960	14	Master.	grav..	cone..	Fuller..	selec...	Covert.	amid..	3	worm	Timkn.	8.5	r-rd....	spgs...	Kal...	int-r-w.	int-r-w.	l....	Ross..	c....	metl...	K-B...	DeKalb.....E-2
1,065	14	Master.	grav..	cone..	Fuller..	selec...	Covert.	amid..	3	worm	Timkn.	9.33	r-rd....	spgs...	Mthr...	int-r-w.	int-r-w.	l....	Ross..	c....	metl...	K-B...	DeKalb.....E-2½
1,200	20	Stmbg..	grav..	d-p...	B-Beck.	selec...	G-Lees.	mtr...	3	in-g...	Torb...	8	spgs...	spgs...	Dtrt...	ext-r-w.	int-r-w.	l....	Ditw..	c....	metl...	Arvac..	Defiance.....B
1,300	16	Stmbg..	grav..	d-d...	Dtrt...	selec...	Dtrt...	mtr...	3	in-g...	Russl..	8.2	spgs...	spgs...	Dtrt...	ext-r-w.	int-r-w.	l....	Gem...	c....	metl...	Univ...	Denby.....12
1,330	14	Stmbg..	grav..	d-d...	Dtrt...	selec...	Dtrt...	mtr...	3	in-g...	Russl..	10.2	spgs...	spgs...	Dtrt...	ext-r-w.	int-r-w.	l....	Gem...	c....	metl...	Univ...	Denby.....13
1,270	12½	Stmbg..	grav..	d-d...	Dtrt...	selec...	Dtrt...	mtr...	3	in-g...	Russl..	10.9	spgs...	spgs...	Dtrt...	ext-r-w.	int-r-w.	l....	Gem...	c....	metl...	Univ...	Denby.....15
1,050	10	Stmbg..	grav..	d-d...	own....	selec...	Warner	amid..	4	in-g...	Clark..	12.55	spgs...	spgs...	Dtrt...	int-r-w.	int-r-w.	l....	Ross..	c....	metl...	Univ...	Denby.....210
1,100	18	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm	Timkn.	7.75	spgs...	spgs...	Mthr...	int-r-w.	int-r-w.	l....	Gem...	c....	metl...	Spicer.	Diamond-T.....J5
1,100	16	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm	Timkn.	7.75	spgs...	spgs...	Mthr...	int-r-w.	int-r-w.	l....	Gem...	c....	metl...	Spicer.	Diamond-T.....J4
1,050	15	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm	Timkn.	7.75	spgs...	spgs...	Mthr...	int-r-w.	int-r-w.	r....	Gem...	c....	metl...	Spicer.	Diamond-T.....J3
1,050	12	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	4	worm	Timkn.	10.33	spgs...	spgs...	Mthr...	int-r-w.	int-r-w.	l....	Gem...	c....	metl...	Spicer.	Diamond-T.....LB
1,050	10	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	4	worm	Timkn.	11.66	spgs...	spgs...	Mthr...	int-r-w.	int-r-w.	l....	Gem...	c....	metl...	Spicer.	Diamond-T.....R
950	10	Master.	grav..	d-d...	B-Lipe.	selec...	.....	mtr...	3	chn...	own...	10.5	r-rd....	spgs...	.....	ext-d-s.	int-r-w.	r....	Lavn..	c....	fab....	own...	Doane.....1919
1,096	15	Stmbg..	grav..	d-d...	Warner	selec...	Warner	amid..	4	worm	Timkn.	7.75	spgs...	spgs...	Rowl...	int-r-w.	int-r-w.	l....	Ross..	c....	metl...	Spicer.	Dorris.....K4
1,150	15	Schblr..	vacm..	d-p...	B-Beck.	selec...	G-Lees.	mtr...	3	in-g...	Torbn..	8	spgs...	spgs...	own...	ext-r-w.	int-r-w.	l....	Ross..	c....	metl...	Arvac..	Douglas.....TA
1,120	15	Schblr..	vacm..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	4	in-g-4.	own...	16.0	r-rd*...	spgs...	Tut...	ext-d-s.	ext-r-w.	l....	Lavn..	c....	metl...	Blood..	Duplex.....E
.....	.....	Carter..	grav..	cone*	Mech..	prog...	Mech..	mtr...	3	bevl...	Gemco.	.....	spgs...	spgs...	Shel...	int-r-w.	int-r-w.	l....	Fost..	c....	.....	own...	Ellsworth.....25A
1,100	15	Zenith..	grav..	d-p...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm	Timkn.	7.7	spgs...	spgs...	.....	int-r-w.	int-r-w.	.....	Ross..	.....	.....	.....	Fageol.....
1,250	15	Rayfld.	grav..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	in-g...	Russl..	.....	spgs...	spgs...	Shel...	ext-r-w.	int-r-w.	l....	Jacx..	c....	metl...	Spicer.	Fargo.....P
1,150	18	Zenith..	grav..	d-p...	B-Beck.	selec...	own....	amid..	3	worm	Timkn.	7	r-rd....	spgs...	Mthr...	int-r-w.	int-r-w.	l....	Gem...	c....	metl...	Spicer.	Federal.....S
1,190	15	Zenith..	grav..	d-p...	B-Beck.	selec...	Dtrt...	amid..	4	worm	Timkn.	8.5	r-rd....	spgs...	Mthr...	int-r-w.	int-r-w.	l....	Gem...	c....	metl...	Spicer.	Federal.....T
1,125	13	Zenith..	grav..	d-p...	B-Beck.	selec...	Dtrt...	amid..	4	worm	Timkn.	9.25	r-rd....	spgs...	Mthr...	int-r-w.	int-r-w.	l....	Gem...	c....	metl...	Spicer.	Federal.....U
1,150	12	Zenith..	grav..	d-p...	B-Beck.	selec...	Warner	amid..	4	worm	Timkn.	10.33	r-rd....	spgs...	Mthr...	int-r-w.	int-r-w.	l....	Gem...	c....	metl...	Spicer.	Federal.....W
1,150	10	Zenith..	grav..	d-p...	B-Beck.	selec...	Warner	amid..	4	worm	Timkn.	13.66	r-rd.	spgs	Mthr...	int-r-w.	int-r-w.	l....	Gem...	c....	metl...	Spicer.	Federal.....X
.....	18	Zenith..	grav..	d-d...	Dtrt...	selec...	.....	mtr...	3	worm	Shel...	6.50	spgs...	spgs...	Del...	int-r-w.	int-r-w.	.....	Ross..	.....	.....	.....	Forschler.....
1,200	16	Zenith..	grav..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	worm	Shel...	7.7	spgs...	spgs...	Del...	int-r-w.	int-r-w.	.....	Ross..	.....	.....	.....	Forschler.....
1,200	14	Zenith..	grav..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	worm	Shel...	8.6	spgs...	spgs...	Del...	int-r-w.	int-r-w.	.....	Ross..	.....	.....	.....	Forschler.....
1,200	12	Zenith..	grav..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	worm	Shel...	8.8	spgs...	spgs...	Del...	int-r-w.	int-r-w.	.....	Ross..	.....	.....	.....	Forschler.....
1,373	18	own...	grav..	w-d...	own...	plan...	own...	mtr...	2	worm	own...	.....	r-rd....	t-t....	Mthr*..	ext-d-s.	int-r-w.	l....	own...	l....	metl...	own...	Ford.....TT
1,350	15	Stmbg..	grav..	w-d...	M & E.	ind-c...	Cotta..	amid..	3	bevl-4.	own...	8.9	spgs...	tor-a...	Tut...	ext-d-s.	ext-r-w.	r....	Ross..	r....	metl...	Blood..	F.W.D.....B
1,800	18	Carter.	grav..	d-p...	B-Beck.	selec...	own...	mtr...	3	in-g...	Russl..	8.2	spgs...	spgs...	Perf...	ext-r-w.	int-r-w.	l....	Lavn..	c....	fab....	Hart...	Fulton.....FX
1,200	25	Rayfld.	grav..	d-p...	B-Beck.	selec...	B-Lipe.	amid..	3	worm	Timkn.	.....	r-rd....	tor-a...	Merl...	int-r-w.	int-r-w.	l....	Gem...	c....	metl...	Spicer.	Gabriel.....C
1,100	18	Rayfld.	grav..	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	worm	Timkn.	.....	r-rd....	spgs...	Merl...	int-r-w.	int-r-w.	l....	Gem...	c....	metl...	Spicer.	Gabriel.....E
1,000	12	Rayfld.	grav..	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	worm	Timkn.	.....	r-rd....	spgs...	Merl...	int-r-w.	int-r-w.	l....	Gem...	c....	metl...	Spicer.	Gabriel.....F
1,303	18	Rayfld.	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	3	worm	Timkn.	7.75	spgs...	spgs...	Perf...	int-r-w.	int-r-w.	r....	Ross..	c....	metl...	Spicer.	Garford.....75-C

ABBREVIATIONS—Makers of Parts

*Other Options
A-K—Atwater-Kent
Al-Ch—Allis-Chalmers
Aut-L—Auto-Lite
B-Beck—Borg & Beck
B-Lipe—Brown-Lipe
Blng—Berling
Brem—Bremer
Can—Candler
Cant—Canton-Cleveland
CAS—C.A.S. Products Co.
Champ—Champion Spng
Chego—Chicago-Stndrd
Chgo—Chicago Mfg. Co.
Con—Continental
Conn—Connecticut
Cover—Covert
Del—Delany
Ditw—Ditweiler
Dneto—Dyneto
Dtrt—Detroit Press. Stl.
Dtrt—Detroit Lubricat.
Dtrt—Detroit G. & M. Co.
Dtrt—Detroit Stl. Spng.
Duplx—Duplex
E&M—English & Mersick
Eismn—Eisemann
Emp—Empire
Ens—Ensign
Eur—Eureka
Fed—Fedders
Flech—Fletcher
Fost—Foster
Franck—Francke
G&D—Gray & Davis
G&O—G. & O. Mfg. Co.
GBS—Golden, Belknap & Swartz
G-Lees—Grant-Lees
Gem—Gemmer
H&N—H. & N. Carburetor Co.
Har—Harrison
Hart—Hartford
Hays—Hayes
Her—Hercules
Higg—Higgins
Hol—Holley
H-Shaw—Hele-Shaw
H-S—Herschell-Spillman
Hyd—Hydraulic
Idl—Ideal
Ind—Industrial Equipment Co.
Iron—Iron City
J-A—Jackson Radiator Wks.
Jacox—Jackson-Church-Wilcox
Jas—Jamestown Car Pts. Co.
Jhnson—Johnson
Kal—Kalamazoo
K-B—Kinsler-Bennett
Key-H—Keystone-Hindley
King—Kingston
Koko—Kokomo
Lau—Lauraine
Lavn—Lavine
LeR—LeRoi
Lgt—Light Foundry
Ligt—Liggett
L-N—Leece Neville
Lyc—Lycoming
Marvl—Marvel
Mast—Master
McC—McCord
McFar—McFarland
Mech—Mechanics
Merl—Merrill
Mil—Milwaukee
Mnrch—Monarch
Mod—Modine
Mthr—Mather
M&E—Merchant & Evans
Natl—National
N.A.—North American
N-E—North East
Nlite—Nicolite
Penn—Penn Spring Co.
P&B—Parish & Bingham
Per—Perfex
Perf—Perfection
Prsh—Parish
R-T—Rome-Turney
Rayfld—Rayfield
Rem—Remy
Rowl—Wm. Harvel Rowland
Rugles—Ruggles
Russl—Russel
Rut—Rutenber
Savg—Savage Arms
Salsby—Salisbury
Schblr—Schebler
Shel—Sheldon
Shkspr—Shakespeare
Smth—A. O. Smith
S-P—Spring-Perch
Spltf—Splitdorf
Stan—Standard Radiator Co.
Stand—Standard Steel Spring Co.
Stewrt—Stewart
Stlg—Sterling
Stmbg—Stromberg
Sundmn—Sunderman
S-W—Sparks-Withington
Therm—Thermoid
Timkn—Timken
Tltsn—Tillotson
Torbn—Torbenson
Tut—Tuthill
Univ—Universal Machine Co.
Wau—Waukesha
West—Westinghouse
Wis—Wisconsin
Wol—Wohlrab
W-W—Walker-Weiss

Detailed Technical Specifications of

Name and Model	Tons Capacity	Chassis Price	Wheelbase Inches	FRAME			TIRES			Wheels	ENGINE															
								Size in Ins.							COOLING			IGNITION			ELEC. SYSTEM			GOVERNOR		
				Make	Material	Type	Kind	Front	Rear		Make	No. Cyl. Bore and Stroke—N.A.C.C. Hp.	Cylinders Cast	Water Circ.	Radiator Make	Radiator Core and Case	Type	Make	Spark Advance	Type	Make	Extra Cost $	Type	Make	Drive
Garford....66-B	1½	3,000	144	own...	p-stl.	s-flex.	opt..	36x3½	36x5	wd..	Buda	4-3¾x5½-22.5	4	cent...	own..	fin-cst...	sing..	Spltf..	hand.	s&l...	West..	175	cent..	Duplx...	motor.
Garford....70-B	2	3,300	142	own...	p-stl.	s-flex.	opt..	36x4	36x7	wd..	Buda	4-4½x5½-29.0	4	cent...	own..	fin-cst...	sing..	Spltf..	hand.	s&l...	West..	175	cent..	Duplx...	motor.
Garford....77-B	3½	4,300	128	own...	p-stl.	s-flex.	opt..	36x5	40x5d	wd..	Wis..	4-4½x6 -29.0	4	cent...	own..	fin-cst...	dual..	Eismn	hand.	ltg....	West..	125	cent..	Duplx...	motor.
Garford....68	5	5,000	128	own...	p-stl.	s-flex.	s....	36x6	40x6d	c-s..	Wis..	4-4½x5½-36.1	2	cent...	own..	fin-cst...	dual..	Eismn	hand.	ltg....	West..	125	cent..	Duplx...	motor.
Garford....69	6	5,300	128	own...	p-stl.	s-flex.	s....	36x6	40x7d	c-s..	Wis.	4-5½ox5½-41.6	2	cent...	own..	fin-cst...	dual..	Eismn	hand.	ltg....	West..	125	cent..	Duplx...	motor.
Garford Tractor....70-B	4½	3,400	116	own...	p-stl.	s-flex.	s....	36x4	36x7	wd..	Buda	4-4½x5½-29.0	4	cent...	own..	fin-cst...	sing..	Spltf..	hand.	ltg....	West..	125	cent..	Duplx...	motor.
Garford Tractor....77	7	4,400	105	own...	p-stl.	s-flex.	s....	36x5	40x5d	wd..	Wis..	4-4½x5½-36.1	2	cent...	own..	fin-cst...	dual..	Eismn	hand.	ltg....	West..	125	cent..	Duplx...	motor.
Garford Tractor....68	10	5,100	102	own...	p-stl.	s-flex.	s....	36x6	40x6d	c-s..	Wis..	4-5½ox5½-41.6	2	cent...	own..	fin-cst...	dual..	Eismn	hand.	ltg....	West..	125	cent..	Duplx...	motor.
Gary....F	1	.....	130	P&B..	p-stl.	flex..	s....	36x3½	36x4	wd..	Con..	4-3½x5 -22.5	4	ther...	.....	zz-ps...	sing..	Eismn	hand.	ltg....	Vesta.	....	cent..	Pierce...	motor.
Gary....G	1½	.....	144	P&B..	p-stl.	flex..	s....	36x3½	36x5	wd..	Buda	4-4½x5½-29.0	4	cent...	Chgo	fin-cst...	sing..	Eismn	hand.	ltg....	Vesta.	....	cent..	Pierce...	motor.
Gary....H	2	.....	156	P&B..	p-stl.	flex..	s....	36x4	36x6	wd..	Buda	4-4½x5½-29.0	4	cent...	Chgo	fin-cst...	sing..	Eismn	hand.	ltg....	Vesta.	....	cent..	Simplex.	motor.
Gary....HU	2½	.....	162	P&B..	p-stl.	flex..	s....	36x4	36x7	wd..	Buda	4-4½x5½-29.0	4	cent...	Chgo	fin-cst...	sing..	Eismn	hand.	ltg....	Vesta.	....	cent..	Simplex.	motor.
Gary....K	3½	.....	162	own...	rol-c.	s-flex.	s....	36x5	36x5d	wd..	Buda	4-4½x6 -32.4	4	cent...	Chgo	fin-cst...	sing..	Eismn	hand.	ltg....	Vesta.	....	cent..	Duplx...	motor.
Gem	¾	675	....	.....	.....	.....	pnu..	31x4	31x4	....	GBS.	4-3½x4½-22.5	4	.....	.....	.....	sing..	Conn..	hand.	s&l...	Dynt..	....	.....	.....	.....
Geneva	1	650	96	.....	.....	.....	s....	34x2	36x2½	....	Beav.	2-5½x4½-22.1	1	.....	.....	.....	sing..	Simms	fix...	.....	.....	....	.....	.....	.....
Giant....15	1	1,850	138	Hyd..	p-stl.	s-flex.	opt..	34x3½	34x5	wd..	Con..	4-3½x5 -19.6	4	ther...	Idl...	cel-sht...	sing..	Eismn	hand.	lgt....	Dtrt..	50	.....	.....	.....
Giant....14	1½	2,400	138	Hyd..	p-stl.	s-flex.	s....	34x3½	34x5	wd..	Con..	4-3½x5 -19.6	4	ther...	Idl...	cel-sht...	sing..	Eismn	hand.	lgt....	Dtrt..	50	.....	.....	.....
Giant....16	2	2,850	144	Hyd..	p-stl.	s-flex.	pnu..	36x4	36x7	wd..	Con..	4-4½x5½-27.2	4	cent..	own..	cel-c-a...	sing..	Eismn	hand.	lgt....	Dtrt..	60	none	.....	.....
Giant....17	3½	3,850	176	own...	p-stl.	s-flex.	s....	36x5	36x5d	wd..	Con..	4-4½x5½-32.4	2	cent...	own..	cel-c-a...	sing..	Eismn	hand.	lgt....	Dtrt..	60	cent..	Pierce...	motor.
Globe....A	1	1,490	132	.....	.....	.....	s....	34x3½	34x4	....	Con..	4-3½x5 -19.6	4	.....	.....	.....	sing..	Eismn	fix...	.....	.....	....	cent..	Pierce...	motor.
Globe....B	1½	1,850	144	.....	.....	.....	s....	36x3½	36x5	....	Con..	4-3½x5½-22.5	4	.....	.....	.....	sing..	Eismn	fix...	.....	.....	....	cent..	Pierce...	motor.
Globe....C	2	2,190	154	.....	.....	.....	s....	36x4	36x6	....	Con..	4-4½x5½-27.2	4	.....	.....	.....	sing..	Eismn	fix...	.....	.....	....	cent..	Pierce...	motor.
G. M. C....16	¾	1,775	....	Dtrt..	p-stl.	s-flex.	pnu..	35x5	35x5	wd..	Con..	4-3½x5 -22.5	4	cent...	McC.	fin-pst...	sing..	Eismn	hand.	.....	.....	....	sue..	Mnrch...	motor.
G. M. C....21	1	2,125	....	Prsh..	p-stl.	s-flex.	opt..	34x3½	34x5	wd..	Con..	4-3½x5 -22.5	4	cent...	McC.	fin-cst...	sing..	Eismn	hand.	.....	.....	....	sue..	Mnrch...	motor.
G. M. C....31	1½	2,500	....	Prsh..	p-stl.	s-flex.	s....	36x3½	36x5	wd..	Con..	4-3½x5 -22.5	4	cent...	McC.	fin-cst...	sing..	Eismn	hand.	.....	.....	....	sue..	Mnrch...	motor.
G. M. C....41	2	2,800	....	Prsh..	p-stl.	s-flex.	s....	36x4	36x4d	wd..	Con..	4-4½x5½-27.2	4	cent...	McC.	fin-cst...	sing..	Eismn	hand.	.....	.....	....	sue..	Mnrch...	motor.
G. M. C....71	3½	3,950	....	own...	rol-c.	s-flex.	s....	36x5	40x5d	c-s..	Con..	4-4½x5½-32.4	2	cent...	McC.	fin-cst...	sing..	Eismn	hand.	.....	.....	....	sue..	Mnrch...	motor.
G. M. C....101	5	4,550	....	own...	rol-c.	s-flex.	s....	36x6	40x6d	c-s..	Con..	4-4½x5½-32.4	2	cent...	McC.	fin-cst...	sing..	Eismn	hand.	.....	.....	....	sue..	Mnrch...	motor.
Gramm-Bernstein....W	1½	2,450	130	.....	p-stl.	s-flex.	s....	34x3½	36x5	wd..	Wau.	4-3½x5½-22.5	4	cent...	own..	fin-cst...	sing..	Eismn	hand.	.....	.....	....	l-b..	Wau...	motor.
Gramm-Bernstein....W	2	2,750	146	.....	p-stl.	.....	s....	34x4	34x3½d	wd..	Wau.	4-3½x5½-22.5	4	cent...	own..	fin-cst...	sing..	Eismn	hand.	.....	.....	....	l-b..	Wau...	motor.
Gramm-Bernstein....W	2½	3,350	156	.....	p-stl.	s-flex.	s....	36x4	36x4d	wd..	Wau.	4-4½x5½-29.0	2	cent...	own..	fin-cst...	dual..	Eismn	hand.	.....	.....	....	cent..	Wau...	motor.
Gramm-Bernstein....W	3½	4,000	158	.....	p-stl.	s-flex.	s....	36x5	40x5d	wd..	Wau.	4-4½x5½-32.4	2	cent...	own..	fin-cst...	dual..	Eismn	hand.	.....	.....	....	cent..	Wau...	motor.
Gramm-Bernstein....W	5	5,000	168	.....	p-stl.	s-flex.	s....	36x6	40x6d	c-s..	Wau.	4-4½x6½-36.1	2	cent...	own..	fin-cst...	dual..	Eismn	hand.	.....	.....	....	cent..	Wau...	motor.
Grant....12	¾	1,125*	115	P&B..	p-stl.	s-flex.	pnu..	32x4	32x4	wd..	Con..	4-3½x5 -16.9	4	ther...	Fed..	cel-pst...	sing..	Spltf..	hand.	s1&i-2.	Bijur.	none	none	none....	none
Grant....19	1½	1,885	124	Savg..	p-stl.	s-flex.	opt..	34x4½	34x5	wd..	Con..	4-3½x5 -22.5	4	ther...	Fed..	cel-pst...	sing..	Spltf..	hand.	s1&i-2.	Remy.	none	cent..	Pierce...	d-s...
Grant....11	1½	1,935	140	Savg..	p-stl.	s-flex.	opt..	34x4½	34x5	wd..	Con..	4-3½x5 -22.5	4	ther...	Fed..	cel-pst...	sing..	Spltf..	hand.	s1&i-2.	Remy.	none	cent..	Pierce...	d-s...
Grant....15	2	2,150	124	Savg..	p-stl.	s-flex.	opt..	34x4	34x6	wd..	Con..	4-3½x5 -22.5	4	ther...	Fed..	cel-pst...	sing..	Spltf..	hand.	s1&i-2.	Remy.	none	cent..	Pierce...	d-s...
Grant....16	2	2,250	140	Savg..	p-stl.	s-flex.	opt..	34x4	34x6	wd..	Con..	4-3½x5 -22.5	4	ther...	Fed..	cel-pst...	sing..	Spltf..	hand.	s1&i-2.	Remy.	none	cent..	Pierce...	d-s...
Hahn....G	1	1,375	127	Prsh*.	p-stl.	s-flex.	opt..	34x3	34x4	wd..	Con..	4-3½x5 -19.6	4	ther...	Idl...	zz-t-sht...	sing..	Eismn	hand.	.....	.....	....	.....	.....	.....
Hahn....C	1½	1,950	135	Prsh*.	p-stl.	s-flex.	opt..	36x3½	36x5	wd..	Con..	4-4½x5½-27.2	4	cent...	Chgo	fin-cst...	sing..	Bosc*	hand.	.....	.....	....	sue...	Pierce...	motor.
Hahn....E	2½	2,500	145	Prsh*.	p-stl.	s-flex.	opt..	36x4	36x4d	wd..	Con..	4-4½x5½-32.4	2	cent...	Chgo	fin-cst...	sing..	Bosc*	hand.	.....	.....	....	sue...	Pierce...	motor.
Hall		2	2,675	156	.....	.....	.....	s....	36x4	36x4d	wd..	Con..	4-4½x5½-27.2	4	.....	Long.	.....	sing..	Bosc*	fix...	.....	.....	....	cent..	Duplx...	motor.
Hall		3½	3,500	144	.....	.....	.....	s....	36x5	36x5d	wd..	Con..	4-4½x5½-32.4	2	.....	Long.	.....	sing..	Bosc*	fix...	.....	.....	....	cent..	Duplx...	motor.
Hall		5	4,500	144	.....	.....	.....	s....	36x5	40x6d	wd..	Con..	4-4½x5½-32.4	2	.....	Long.	.....	sing..	Bosc*	fix...	.....	.....	....	cent..	Duplx...	motor.
Hall		7	4,500	144	.....	.....	.....	s....	36x5	40x6d	wd..	Con..	4-4½x5½-32.4	2	.....	Long.	.....	sing..	Bosc*	fix...	.....	.....	....	cent..	Duplx...	motor.
Harvey....WFA	2½	3,000	150	own...	rol-c.	flex..	s....	36x4	36x7	wd..	Buda	4-4½x5½-29.0	4	g.p....	own..	fin-cst...	sing..	Eismn	auto	.....	.....	....	cent..	Duplx...	motor.
Harvey....WHA	3½	3,900	160	own...	rol-c.	flex..	s....	36x5	36x5d	wd..	Buda	4-4½x6 -29.0	4	g.p....	own..	fin-cst...	sing..	Eismn	auto	.....	.....	....	cent..	Duplx...	motor.
Harvey....WKA	5	5,000	160	own...	rol-c.	flex..	s....	36x6	40x6d	wd..	Buda	4-4½x6 -32.4	4	g.p....	own..	fin-cst...	sing..	Eismn	auto	.....	.....	....	cent..	Duplx...	motor
Harvey Tractor....HT	10	4,000	125	.....	.....	.....	s....	36x5	36x5d	....	Buda	4-4½x6 -32.4	4	.....	.....	.....	sing..	Eismn	auto	s&l...	West..	....	cent..	Duplx...	motor.
Hawkeye....K	1½	1,900	148	own...	rol-c.	s-flex.	opt..	34x3½	34x5	wd..	Buda	4-3½x5½-22.5	4	cent...	Idl...	cel-cst...	sing..	Eismn	hand.	ltg...	Vesta.	75	cent..	Simplex.	motor.
Hawkeye....L	2	2,500	148½	own...	rol-c.	s-flex.	opt..	34x4	34x6	wd..	Buda	4-3½x5½-22.5	4	cent...	Idl...	cel-cst...	sing..	Eismn	hand.	ltg...	Vesta.	75	cent..	Simplex.	motor.
Hendrickson		2	2,850	140	.....	.....	.....	s....	36x4	36x4d*	wd..	Wau.	4-4½x5½-29.0	....	cent...	.....	cst....	sing..	Dixie..	hand.	.....	.....	....	cent..	Wau....	motor.
Hendrickson		3½	3,600	160	.....	.....	.....	s....	36x5	36x5d	wd..	Wau.	4-4½x5½-32.4	....	cent...	.....	cst....	sing..	Dixie..	hand.	.....	.....	....	cent..	Wau....	motor.
Higrade....A17	¾	1,850	115	.....	.....	.....	pnu..	35x5	35x5	....	Con..	4-3½x5 -19.6	4	.....	.....	.....	sing..	Simms	....	s&l...	L-N....	....	cent..	Simplex.	motor.
Higrade....A18	1	2,100	115	.....	.....	.....	pnu..	35x5	35x5	....	Con..	4-3½x5 -19.6	4	.....	.....	.....	sing..	Simms	....	s&l...	L-N....	....	cent..	Simplex.	motor.
Hoover....15-B	1	1,435	120	Dtrt..	p-stl.	s-flex.	pnu..	32x4	33x4½	wd..	Con.	4-3½x5 -19.6	4	ther...	Can..	cel-sht...	dual..	Spltf..	hand.	none..	none..	none	.....	.....	.....
Hupmobile	½	1,350	112	Dtrt..	p-stl.	.....	pnu..	33x4	33x4	wd..	own..	4-3½x5½-16.9	4	ther...	McC.	cel-pst...	sing..	A-K..	hand.	.....	West..	....	.....	.....	.....
Hurlburt		2	3,500	148	.....	p-stl.	rigid.	s....	36x4	36x4d	wd..	Buda	4-4½x5½-29.0	4	cent...	own..	fin-cst...	dual..	Eismn	auto	ltg....	Vesta.	none	cent..	Duplx...	motor.
Hurlburt		3½	4,250	146	.....	p-stl.	rigid.	s....	36x5	36x5d	wd..	Buda	4-4½x6 -32.4	4	cent...	own..	fin-cst...	dual..	Eismn	auto	ltg....	Vesta.	none	cent..	Duplx...	motor.
Hurlburt		5	5,250	156	.....	p-stl.	rigid.	s....	36x5	40x6d	wd..	Buda	4-4½x6 -32.4	4	cent...	own..	fin-cst...	dual..	Eismn	auto	ltg....	Vesta.	none	cent..	Duplx...	motor.
I. H. C....H	¾	1,550	115	P&B..	p-stl.	.....	s....	36x3	36x3½	wd..	own..	4-3½x5½-19.6	4	cent...	Long.	fin-pst...	sing..	Bosch.	hand.	s&l*.	N-E..	125	cent..	own....	motor.
I. H. C....F	1	1,850	128	P&B..	p-stl.	.....	s....	36x3½	36x4	wd..	own..	4-3½x5½-19.6	4	cent...	Long.	fin-pst...	sing..	Bosch.	hand.	s&l*.	N-E..	125	cent..	own....	motor.
I. H. C....K	1½	2,200	129	P&B..	p-stl.	.....	s....	36x3½	36x5	wd..	own..	4-3½x5½-19.6	4	cent...	Long.	fin.....	sing..	Bosch.	hand.	s&l*.	N-E..	125	cent..	own....	motor.
I. H. C....G	2	2,600	138½	P&B..	p-stl.	.....	s....	36x4	36x6	wd..	own..	4-4 x5 -25.6	4	ther....	.....	cel-cst...	sing..	Spltf..	hand.	s&l*.	N-E..	135	cent..	own....	motor.
Independent....F	1	1,485	128*	.....	.....	.....	s*	36x2*	36x4*	....	Con.	4-3½x5 -19.6	4	.....	.....	.....	sing..	Eismn	fix...	s&l...	Jesco..	....	suc..	Mnrch...	motor.
Independent....G	2	2,250	144	.....	.....	.....	s....	36x3½	36x5	....	Con.	4-4½x5½-27.2	4	.....	.....	.....	sing..	Eismn	fix...	none..	none..	none	suc..	Mnrch...	motor

ABBREVIATIONS—Types of Construction

*Other Options
amid—amidships
auto—automatic
bevl—bevel
c—center
c&l—center and left
c&s—cushion and solid
cent—centrifugal
c-s—cast steel
c-a—cast aluminum
cel-cst—cellular core, cast case
cel-pst—cellular core, pressed steel case
cel-sht—cellular core, sheet case
chn—chain
cylinders cast, 2 in pairs
cylinders cast, 4 in block
cylinders cast, 3 in threes
cylinders cast, 1 singly
d-d—dry disk
d-p—dry plate
d-rd—double reduction
d-s—driveshaft
elec—electric
ext-d-s—external driveshaft
ext-f-w—external front wheels
ext-g—external gear
ext-jst—external jackshaft
ext-r-w—external rear wheel
fab—fabric
fin—finned tube
fin-c-a—finned tube core, cast aluminum case
fin-cst—finned tube core, cast case
fin-pst—finned tube core, pressed steel case
fin-sht—finned tube core, sheet case
flx—fixed
flex—flexible
fric—friction
g.p.—gear pump
grav—gravity
gset—gearset
hyd—hydraulic
ind-c—individual clutch
int-d-s—internal drive-shaft
int-f-w—internal front wheels
in-g—internal gear
in-g-4—internal gear drive on 4 wheels
int-r-w—internal rear wheel
jst—unit with jackshaft
l—left
l&c—left and center
leat—leather
l-b—loose ball
ltg—lighting
metl—metal
mtr—unit with motor
opt—optional
p—plate in oil
pist—piston pump
plan—planetary
pnu—pneumatic
pres—pressure
prog—progressive sliding gearset
p-t-c-a—plain tube core, cast aluminum case
p-t-cst—plain tube core, cast case
p-stl—pressed steel
p&s—pneumatic and solid
r—right
r-ax—unit with rear axle
rng-cst—ring core, cast case
rol-c—rolled channel
rol-i—rolled I-beam
r-rd—radius rods
selec—selective sliding gear
s-flex—semi-flexible
stg—starting
s&l—starting and lighting
s,l&i—starting, lighting and ignition
s l&i2—starting, lighting and ignition, two-unit
sing—single
s—solid
s&c—solid and cushion
spgs—springs
sq-t-cst—square tube core, cast iron
sq-t-sht—square tube core, sheet case
stk—stock
sub-f—sub-frame
suc—suction
s-bev—spiral bevel
ther—thermo-syphon
tor-a—torque arm
t-t—torsion tube
unt-x—unit with axle
vacm—vacuum
wd—wood
w-d—multiple disk in oil
worm—top worm
w-p—wet plate
zz-t-cst—zig zag tube core, cast case
zz-t-pst—zig zag tube core, pressed steel case
zz-t-sht—zig-zag tube core, sheet case

Gasoline Motor Trucks for 1919—Continued

ENGINE						TRANSMISSION											BRAKES		CONTROL			UNIVERSALS		
SPEED		FUEL SYS.		CLUTCH		GEARSET				FINAL DRIVE									STEERING GEAR					
Motor in R.p.m.	Truck in M.p.h.	Carbureter Make	Fuel Feed	Type	Make	Type	Make	Placed	Speeds	Type	Axle Make	Total Gear Reduction	Propulsion Taken By	Torque Taken By	Springs Make	Foot	Hand	Placed	Make	Levers	Type	Make	Name and Model
1,269	16	Rayfld.	grav.	d-d	B-Lipe.	selec.	own.	amid.	4	worm.	Timkn.	8.5	spgs.	spgs.	Perf.	int-r-w.	int-r-w.	r.	Ross.	c.	metl.	Spicer.	Garford 66-B
1,035	15	Rayfld.	grav.	d-d	B-Lipe.	selec.	own.	amid.	4	worm.	Timkn.	7.75	spgs.	spgs.	Perf.	int-r-w.	int-r-w.	r.	Ross.	c.	metl.	Spicer.	Garford 70-B
1,041	12	Rayfld.	grav.	d-d	B-Lipe.	selec.	B-Lipe.	amid.	4	worm.	Timkn.	10.33	r-rd.	spgs.	Perf.	int-r-w.	ext-d-s.	l.	Ross.	c.	metl.	Spicer.	Garford 77-B
1,057	11	Rayfld.	grav.	d-d	B-Lipe.	selec.	own.	amid.	4	chn.	own.	11.44	r-rd.	spgs.	Perf.	ext-d-s.	int-r-w.	r.	Ross.	c.	metl.	Spicer.	Garford 68
1,057	10	Rayfld.	grav.	d-d	B-Lipe.	selec.	own.	amid.	4	chn.	own.	12.39	r-rd.	spgs.	Perf.	ext-d-s.	int-r-w.	r.	Ross.	c.	metl.	Spicer.	Garford 69
1,057	10	Rayfld.	grav.	d-d	B-Lipe.	selec.	own.	amid.	4	worm.	Timkn.	9.25	spgs.	spgs.	Perf.	int-r-w.	int-r-w.	l.	Ross.	c.	metl.	Spicer.	Garford Tractor 70-B
1,090	15	Rayfld.	grav.	d-d	B-Lipe.	selec.	own.	amid.	4	worm.	Timkn.	12	r-rd.	spgs.	Perf.	int-r-w.	ext-d-s.	l.	Ross.	c.	metl.	Spicer.	Garford Tractor 77
1,050	11	Rayfld.	grav.	d-d	B-Lipe.	selec.	own.	amid.	4	worm.	Timkn.	11.44	r-rd.	spgs.	Perf.	ext-d-s.	int-r-w.	r.	Ross.	c.	metl.	Spicer.	Garford Tractor 65
1,057	10	Rayfld.	grav.	d-d	B-Lipe.	selec.	own.	amid.	4	chn.	own.	11.44	r-rd.	spgs.	Perf.	ext-d-s.	int-r-w.	r.	Ross.	c.	metl.	Spicer.	Garford Tractor 65
1,275	15	Stmbg.	grav.	d-d	Fuller.	selec.	Fuller.	mtr.	3	worm.	Shel.	.....	spgs.	spgs.	Tut.	int-r-w.	int-r-w.	l.	Lavn.	c.	metl.	Blood.	Gary F
1,275	15	Stmbg.	grav.	d-d	Fuller.	selec.	Fuller.	mtr.	3	worm.	Shel.	.....	spgs.	spgs.	Tut.	int-r-w.	int-r-w.	l.	Lavn.	c.	metl.	Hart.	Gary G
1,275	15	Stmbg.	grav.	d-d	Fuller.	selec.	Fuller.	mtr.	3	worm.	Shel.	.....	spgs.	spgs.	Tut.	int-r-w.	int-r-w.	l.	Lavn.	c.	metl.	Hart.	Gary H
1,275	15	Stmbg.	grav.	d-d	Fuller.	selec.	Fuller.	mtr.	4	worm.	Shel.	.....	spgs.	spgs.	Tut.	int-r-w.	int-r-w.	l.	Lavn.	c.	metl.	Hart.	Gary HU
1,000	12	Stmbg.	grav.	d-d	Warner	selec.	Warner	amid.	4	worm.	Shel.	.....	spgs.	spgs.	Tut.	int-r-w.	int-r-w.	l.	Lavn.	c.	metl.	Blood.	Gary K
.....	.....	Carter.	grav.	d	B-Beck.	selec.	G-Lees.	mtr.	3	bevl.	W-W.	4.1	spgs.	spgs.	.....	ext-r-w.	int-r-w.	.....	Fost.	.....	.....	.....	Gem
1,200	18	Schblr.	grav.	d-p	Warner	plan.	.....	unt-j.	2	chn.	Shel.	4	r-rd.	r-rd.	Shel.	int-r-w.	int-r-w.	.....	.....	.....	.....	Spicer.	Geneva 1
1,100	16	Schblr.	grav.	d-d	Warner	selec.	Warner	mtr.	3	worm.	Timkn.	7	spgs.	spgs.	Mthr.	int-r-w.	int-r-w.	r.	Jacox.	c.	metl.	Spicer.	Giant 13
1,100	13	Schblr.	grav.	d-d	Warner	selec.	Warner	mtr.	3	worm.	Timkn.	8.5	spgs.	spgs.	Mthr.	int-r-w.	int-r-w.	r.	Jacox.	c.	metl.	Spicer.	Giant 14
1,100	15	Schblr.	grav.	d-d	Warner	selec.	Warner	mtr.	3	worm.	Timkn.	23.2	spgs.	spgs.	Mthr.	int-r-w.	int-r-w.	r.	Jacox.	c.	metl.	Spicer.	Giant 16
1,100	12	Stmbg.	grav.	d-d	Warner	selec.	Warner	amid.	4	worm.	Timkn.	10.33	spgs.	spgs.	Dtrt.	int-r-w.	int-r-w.	r.	Ross.	c.	metl.	Spicer.	Giant 17
1,385	20	Master.	vacm.	d-p	B-Beck.	selec.	Cover.	mtr.	3	in-g.	Clark.	7	spgs.	spgs.	Shel.	ext-r-w.	int-r-w.	.....	Lavn.	.....	metl.	Univ.	Globe A
1,300	18	Master.	vacm.	d-p	B-Beck.	selec.	Cover.	mtr.	3	in-g.	Shel.	7.5	spgs.	spgs.	Shel.	ext-r-w.	int-r-w.	.....	Lavn.	.....	metl.	Univ.	Globe B
1,250	16	Master.	vacm.	d-p	B-Beck.	selec.	Cover.	mtr.	3	in-g.	Clark.	8	spgs.	spgs.	Shel.	ext-r-w.	int-r-w.	.....	Lavn.	.....	metl.	Univ.	Globe C
1,150	20	own.	grav.	d-d	own.	selec.	own.	mtr.	3	bevl.	own.	6	r-rd.	spgs.	.....	.....	.....	.....	.....	.....	.....	.....	.....
1,600	18	Marvel.	grav.	d-d	own.	selec.	own.	mtr.	3	worm.	Timkn.	7.75	r-rd.	spgs.	Dtrt.	int-r-w.	int-r-w.	l.	Lavn.	c.	metl.	Univ.	G. M. C. 16
1,600	15	Marvel.	grav.	d-d	own.	selec.	own.	mtr.	4	worm.	Timkn.	9.25	r-rd.	spgs.	Dtrt.	int-r-w.	int-r-w.	l.	Lavn.	c.	metl.	Univ.	G. M. C. 21
1,600	14	Marvel.	grav.	d-d	own.	selec.	own.	mtr.	4	worm.	Timkn.	9.25	r-rd.	spgs.	Dtrt.	int-r-w.	int-r-w.	l.	Lavn.	c.	metl.	Univ.	G. M. C. 31
1,600	12	Marvel.	grav.	d-d	own.	selec.	own.	mtr.	4	worm.	Timkn.	9.25	r-rd.	spgs.	Dtrt.	int-r-w.	int-r-w.	l.	Lavn.	c.	metl.	Univ.	G. M. C. 41
1,500	12	Marvel.	grav.	d-d	own.	selec.	own.	amid.	4	worm.	Timkn.	12	r-rd.	spgs.	Dtrt.	int-r-w.	int-r-w.	l.	Lavn.	c.	metl.	Univ.	G. M. C. 71
1,500	12	Marvel.	grav.	d-d	own.	selec.	Warner	amid.	4	worm.	Timkn.	13.67	r-rd.	spgs.	Dtrt.	int-r-w.	int-r-w.	l.	Lavn.	c.	metl.	Univ.	G. M. C. 101
1,200	17	Zenith.	grav.	d-d	own.	ind-c.	own.	amid.	3	worm.	Shel.	7.75	spgs.	spgs.	.....	int-r-w.	ext-r-w.	l.	Ross.	c.	metl.	Arvac.	Gramm-Bernstein W
1,200	14	Zenith.	grav.	d-d	own.	ind-c.	own.	amid.	3	worm.	Shel.	8.66	spgs.	spgs.	.....	int-r-w.	ext-r-w.	l.	Ross.	c.	metl.	Arvac.	Gramm-Bernstein W
1,150	16	Zenith.	grav.	d-d	own.	ind-c.	own.	amid.	3	worm.	Shel.	7.75	spgs.	spgs.	.....	int-r-w.	int-r-w.	l.	Ross.	c.	metl.	Arvac.	Gramm-Bernstein W
1,100	15	Zenith.	grav.	d-d	own.	ind-c.	own.	amid.	4	worm.	Shel.	8.75	spgs.	spgs.	.....	int-r-w.	int-r-w.	l.	Ross.	c.	fab.	own.	Gramm-Bernstein W
1,050	12½	Zenith.	grav.	cone.	own.	ind-c.	own.	amid.	4	worm.	Shel.	10.25	spgs.	spgs.	.....	int-r-w.	int-r-w.	l.	Ross.	c.	fab.	own.	Gramm-Bernstein W
.....	.....	Carter.	vacm.	d-p	B-Beck.	selec.	G-Lees.	mtr.	3	in-g.	Torbn.	5.33	t-t.	spgs.	Cooper.	ext-r-w.	int-r-w.	l.	Ditw.	c.	metl.	Arvac.	Grant 12
1,400	20	Carter.	vacm.	d-p	B-Beck.	selec.	G-Lees.	mtr.	3	in-g.	Torbn.	7	t-t.	spgs.	Cooper.	ext-r-w.	int-r-w.	l.	Jacox	c.	metl.	Arvac.	Grant 10
1,400	20	Carter.	vacm.	d-p	B-Beck.	selec.	G-Lees.	mtr.	3	in-g.	Torbn.	7	t-t.	spgs.	Cooper.	ext-r-w.	int-r-w.	l.	Jacox	c.	metl.	Arvac.	Grant 11
1,400	14	Carter.	vacm.	d-p	B-Beck.	selec.	G-Lees.	mtr.	3	in-g.	Torbn.	7	t-t.	spgs.	Cooper.	ext-r-w.	int-r-w.	l.	Jacox	c.	metl.	Arvac.	Grant 15
1,400	14	Carter.	vacm.	d-p	B-Beck.	selec.	G-Lees.	mtr.	3	in-g.	Torbn.	7	t-t.	spgs.	Cooper.	ext-r-w.	int-r-w.	l.	Jacox	c.	metl.	Arvac.	Grant 16
1,500	22	Stmbg.	grav.	d-d*	Dtrt*	selec.	Dtrt*	mtr.	3	in-g.	Torbn.	.....	spgs.	spgs.	Del.	ext-r-w.	int-r-w.	l.	Lavn.	c.	metl.	Spicer.	Hahn G
1,500	27	Stmbg.	grav.	d-d	B-Lipe.	selec.	B-Lipe.	mtr.	3	worm.	Timkn.	.....	r-rd.	spgs.	Del.	int-r-w.	int-r-w.	l.	Lavn.	c.	metl.	Spicer.	Hahn C
1,500	38	Stmbg.	grav.	d-d	B-Lipe.	selec.	B-Lipe.	mtr.	3	worm.	Timkn.	.....	r-rd.	spgs.	Del.	int-r-w.	int-r-w.	l.	Ross.	c.	metl.	Spicer.	Hahn E
1,500	18	Zenith.	grav.	d-d	B-Lipe.	selec.	B-Lipe.	mtr.	3	worm.	Timkn.	10.33	spgs.	spgs.	Perf*	.....	.....	l.	Gem.	c.	.....	K-B.	Hall
1,500	15	Zenith.	grav.	d-d	B-Lipe.	selec.	B-Lipe.	amid.	3	worm.	Timkn.	10.33	spgs.	spgs.	Perf*	.....	.....	l.	Gem.	c.	.....	K-B.	Hall
1,200	12	Zenith.	grav.	d-d	B-Lipe.	selec.	B-Lipe.	amid.	3	worm.	Timkn.	13.66	spgs.	spgs.	Perf*	.....	.....	l.	Gem.	c.	.....	K-B.	Hall
1,200	12	Zenith.	grav.	d-d	B-Lipe.	selec.	B-Lipe.	mtr.	3	chn.	Timkn.	14.5	r-rd.	r-rd.	Perf*	.....	.....	l.	Gem.	c.	.....	K-B.	Hall
1,000	16	Stmbg.	grav.	d-p	B-Beck.	selec.	B-Lipe.	amid.	4	worm.	Shel.	.....	spgs.	spgs.	Shel.	int-r-w.	int-r-w.	l.	Ross.	c.	metl.	Spicer.	Harvey WFA
1,000	13	Stmbg.	grav.	d-p	B-Beck.	selec.	B-Lipe.	amid.	4	worm.	Shel.	.....	spgs.	spgs.	Shel.	int-r-w.	int-r-w.	l.	Ross.	c.	metl.	Spicer.	Harvey WHA
1,000	12	Stmbg.	grav.	d-p	B-Beck.	selec.	B-Lipe.	amid.	4	worm.	Shel.	.....	spgs.	spgs.	Shel.	int-r-w.	int-r-w.	l.	Ross.	c.	metl.	Spicer.	Harvey WKA
1,000	11	Stmbg.	grav.	d-p	B-Beck.	selec.	B-Lipe.	amid.	4	worm.	Shel.	8.75	spgs.	spgs.	Shel.	int-r-w.	int-r-w.	.....	Ross.	.....	.....	.....	Harvey Tractor HT
1,035	16	Zenith.	grav.	d-d	Fuller.	selec.	Fuller.	mtr.	4	in-g.	Clark.	7	spgs.	spgs.	Dtrt.	ext-r-w.	int-r-w.	l.	Gem.	c.	metl.	Univ.	Hawkeye K
1,100	14	Zenith.	grav.	d-d	Fuller.	selec.	Fuller.	mtr.	4	in-g.	Clark.	9	spgs.	spgs.	Dtrt.	ext-r-w.	int-r-w.	l*	Gem.	c.	metl.	M&E.	Hawkeye L
1,000	15	Stmbg.	grav.	d-d	Fuller.	selec.	Fuller.	mtr.	3	worm.	Timkn.	7.75	r-rd.	tor-a.	Tut.	ext-r-w.	ext-r-w.	l.	Ross.	c.	metl.	.....	Hendrickson
1,100	14	Stmbg.	grav.	d-p	B-Beck.	ind-c.	Cotta.	mtr.	3	worm.	Timkn.	10.3	r-rd.	spgs.	Tut.	int-r-w.	int-r-w.	l.	Ross.	c.	metl.	.....	Hendrickson
.....	20	Zenith.	grav.	p.	Fuller.	ind-c.	Fuller.	mtr.	3	worm.	Shel.	4.56	spgs.	spgs.	.....	ext-r-w.	int-r-w.	.....	Lavn.	.....	.....	.....	Higrade A17
.....	20	Zenith.	grav.	p.	Fuller.	ind-c.	Fuller.	mtr.	3	worm.	Shel.	4.56	spgs.	spgs.	.....	ext-r-w.	int-r-w.	.....	Lavn.	.....	.....	.....	Higrade A18
.....	.....	Schblr.	vacm.	d-d	Fuller.	selec.	Fuller.	mtr.	3	worm.	Shel.	6.5	spgs.	spgs.	Shel.	int-r-w.	int-r-w.	l.	Lavn.	c.	metl.	Acme.	Hoover 15-B
2,200	55	Stmbg.	vacm.	d-d	own.	selec.	own.	mtr.	3	s-bev.	own.	4.91	spgs.	spgs.	Mthr.	ext-r-w.	int-r-w.	l.	Jacox.	c.	metl.	Dtrt.	Hupmobile
1,000	16	Flech.	grav.	d-d	B-Lipe.	selec.	B-Lipe.	mtr.	3	worm.	own.	8.66	r-rd.	tor-a.	.....	int-r-w.	int-r-w.	l.	*	c.	metl.	Spicer.	Hurlburt
1,000	13	Flech.	grav.	d-d	B-Lipe.	selec.	B-Lipe.	mtr.	3	worm.	own.	.....	r-rd.	tor-a.	.....	int-r-w.	int-r-w.	l.	.....	c.	metl.	Spicer.	Hurlburt
1,000	12	Flech.	grav.	d-d	B-Lipe.	selec.	B-Lipe.	mtr.	3	worm.	own.	.....	r-rd.	tor-a.	.....	int-r-w.	int-r-w.	l.	.....	c.	metl.	Spicer.	Hurlburt
1,275	18	Hol.	grav.	d-d	own.	selec.	own.	amid.	3	in-g.	own.	7	spgs.	spgs.	Stand.	int-r-w.	int-r-w.	l.	Lavn.	c.	metl.	own.	I. H. C. H
1,275	17	Hol.	grav.	d-d	own.	selec.	own.	amid.	3	in-g.	own.	8	spgs.	spgs.	Stand.	int-r-w.	int-r-w.	l.	Lavn.	c.	metl.	own.	I. H. C. F
1,275	15	Hol.	grav.	d-d	own.	selec.	own.	amid.	3	in-g.	own.	9	spgs.	spgs.	Stand.	int-r-w.	int-r-w.	l.	Ross.	c.	metl.	own.	I. H. C. K
1,175	14	Ens.	vacm.	d-d	own.	selec.	own.	amid.	3	in-g.	own.	9	spgs.	spgs.	Stand.	int-r-w.	int-r-w.	l.	Ross.	c.	metl.	own.	I. H. C. G
1,350	..	Marvel.	grav.	d-d	B-Lipe.	selec.	.....	mtr.	3	worm.	Chgco.	.....	spgs.	spgs.	.....	int-r-w.	int-r-w.	.....	Lavn.	.....	.....	.....	Independent F
.....	.....	Marvel.	grav.	d-d	.....	selec.	.....	mtr.	3	worm.	.....	.....	spgs.	spgs.	.....	int-r-w.	int-r-w.	.....	.....	.....	.....	.....	Independent G

ABBREVIATIONS—Makers of Parts

*Other Options
A-K—Atwater-Kent
Al-Ch—Allis-Chalmers
Aut-L—Auto-Lite
B-Beck—Borg & Beck
B-Lipe—Brown-Lipe
Blng—Berling
Brem—Bremer
Can—Candler
Cant—Canton-Cleveland
CAS—C.A.S. Products Co.
Champ—Champion Spng.
Chcgo—Chicago-Stndrd.
Chgo—Chicago Mfg. Co.
Con—Continental
Conn—Connecticut
Cover—Covert
Del—Delany
Ditw—Ditweiler
Dneto—Dyneto
Dtrt—Detroit Press. Stl. Co.
Dtrt—Detroit Lubricat.
Dtrt—Detroit G. & M. Co.
Dtrt—Detroit Stl. Spng.
Duplx—Duplex
E&M—English & Mersick
Elsmn—Elsemann
Emp—Empire
Ens—Ensign
Eur—Eureka
Fed—Fedders
Flech—Fletcher
Fost—Foster
Franck—Francke
G&D—Gray & Davis
G&O—G. & O. Mfg. Co.
GBS—Golden, Belknap & Swartz
G-Lees—Grant-Lees
Gem—Gemmer
H&N—H. & N. Carburetor
Har—Harrison
Hart—Hartford
Hays—Hayes
Her—Hercules
Hig—Higgins
Hol—Holley
H-Shaw—Hele-Shaw
H-S—Herschell-Spillman
Hyd—Hydraulic
Idl—Ideal
Ind—Industrial Eqpt. Co.
Iron—Iron City
J-A—Jackson Radiator Wks.
Jacox—Jackson-Church-Wilcox
Jas—Jamestown Car Pts. Co.
Jhnson—Johnson
Kal—Kalamazoo
K-B—Kinsler-Bennett
Key-H—Keystone-Hindley
King—Kingston
Koko—Kokomo
Lau—Lauraine
Lavn—Lavine
LeR—LeRoi
Lgt—Light Foundry
Ligt—Liggett
L-N—Leece Neville
Lyc—Lycoming
Marvl—Marvel
Mast—Master
McC—McCord
McFar—McFarland
Mech—Mechanics
Merl—Merrill
March—Monarch
Mil—Milwaukee
Mod—Modine
Mthr—Mather
M&E—Merchant & Evans
Natl—National
N.A.—North American
N-E—North East
Nlite—Nicolite
Penn—Penn Spring Co.
P&B—Parish & Bingham
Per—Perfex
Perf—Perfection
Prsh—Parish
R-T—Rome-Turney
Rayfld—Rayfield
Rem—Remy
Rowl—Wm. Harvel Rowland
Rugles—Ruggles
Russl—Russel
Rut—Rutenber
Savg—Savage Arms
Salsby—Salisbury
Schblr—Schebler
Shel—Sheldon
Shkspr—Shakespeare
Smth—A. O. Smith
S-P—Spring-Perch
Splif—Spraddon
Stan—Standard Radiator Co.
Stand—Standard Steel Spring Co.
Stewrt—Stewart
Stlg—Sterling
Stmbg—Stromberg
Sundmn—Sunderman
S-W—Sparks-Withington
Therm—Thermoid
Timkn—Timken
Titan—Tillotson
Torbn—Torbenson
Tut—Tuthill
Univ—Universal Machine Co.
Wau—Waukesha
West—Westinghouse
Wis—Wisconsin
Wol—Wohlrab
W-W—Walker-Weiss

Detailed Technical Specifications of

Name and Model	Tons Capacity	Chassis Price	Wheelbase Inches	FRAME Make	FRAME Material	FRAME Type	TIRES Kind	TIRES Size in Ins. Front	TIRES Size in Ins. Rear	Wheels	ENGINE Make	ENGINE No. Cyl. Bore and Stroke—N.A.C.C. Hp.	ENGINE Cylinders Cast	COOLING Water Circ.	COOLING Radiator Make	COOLING Radiator Core and Case	IGNITION Type	IGNITION Make	IGNITION Spark Advance	ELEC. SYSTEM Type	ELEC. SYSTEM Make	ELEC. SYSTEM Extra Cost $	GOVERNOR Type	GOVERNOR Make	GOVERNOR Drive
Indiana T	1	$2,150	135	own..	rol-c.	s-flex.	s*	34x3½	34x4	wd..	Wau.	4-3¾x5½-22.5	4	cent.		fin-cst.	sing..	Eismn	hand.	s&l-2.	West..	175	cent..	Wau.	motor.
Indiana Q	1½	2,600	144	own..	rol-c.	s-flex.	opt.	36x3½	36x5	wd..	Rut.	4-4½x5½-27.2	2	cent.	Long.	fin-cst.	sing..	Eismn	hand.	s&l-2.	West..	175	cent..	Pierce.	motor.
Indiana D	2	2,800	150	own..	rol-c.	s-flex.	opt.	36x4	36x7	wd..	Rut.	4-4½x5½-27.2	2	cent.	Long.	fin-cst.	sing..	Eismn	hand.	s&l-2.	West..	175	cent..	Pierce.	motor.
Indiana R	3½	3,450	156	own..	rol-c.	s-flex.	opt.	36x5	36x5d	c-s.	Rut.	4-4½x5½-30.6	2	cent.	Long.	fin-cst.	sing..	Eismn	hand.	s&l-2.	West..	175	cent..	Pierce.	motor.
Indiana L	5	4,600	167	own..	rol-c.	s-flex.	opt.	36x5	40x6d	wd..	Wau.	4-4½x6½-36.1	2	cent.	Long.	fin-cst.	dual.	Eismn	hand.	s&l-2.	West..	175	cent..	Wau.	motor.
Jumbo A	2	2,500	144	Dtrt.	p-stl.	rigid.	s	36x4	36x6	wd..	Buda	4-4½x5½-29.0	4	cent.	G&O.	cel-cst.	sing..	Eismn	hand.	opt.	opt.		cent..	Duplx.	motor.
Kearns ¼	¼	850	107				pnu.	30x3½	30x3½		Lyc.	4-3¼x5 -16.9	4				sing..	Conn.	hand.	s&l.	Dneto.		none.	none.	none.
Kearns 1½	1½	1,800	136				s	34x3½	34x5		H-S.	4-3¼x5 -16.9	4				sing..	Blng.	hand.	none.	none.	none	none.	none.	none.
Kelly-Springfield K-31	1½	2,750	144	own..	p-stl.	flex.	s	36x3½	36x6	wd*	own.	4-3½x5½-22.5	4	cent.	Fed.	cel-cst.	sing..	Eismn	fix.	s&l-2.	opt.	250	l-b.	own.	motor.
Kelly-Springfield K-32	1½	2,750	144	own..	p-stl.	flex.	s	36x3½	36x6	wd*	own.	4-3½x5½-22.5	4	cent.	Fed.	cel-cst.	sing..	Eismn	fix.	s&l-2.	opt.	250	l-b.	own.	motor.
Kelly-Springfield K-35	2½	3,250	144	own..	p-stl.	flex.	s	36x4	36x4d	wd*	own.	4-3½x5½-22.5	4	cent.	Fed.	cel-cst.	sing..	Eismn	fix.	s&l-2.	opt.	250	l-b.	own.	motor.
Kelly-Springfield K-36	2½	3,250	144	own..	p-stl.	flex.	s	36x4	36x4d	wd*	own.	4-3½x5½-22.5	4	cent.	Fed.	cel-cst.	sing..	Eismn	fix.	s&l-2.	opt.	250	l-b.	own.	motor.
Kelly-Springfield K-40	3½	4,250	150	own..	p-stl.	flex.	s	36x5	40x5d	wd*	own.	4-4¼x6½-32.4	2	cent.	Fed.	cel-cst.	sing..	Eismn	auto	s&l-2.	opt.	250	l-b.	own.	motor.
Kelly-Springfield K-45	4	4,400	150	own..	p-stl.	flex.	s	36x5	40x6d	wd*	own.	4-4¼x6½-32.4	2	cent.	Fed.	cel-cst.	sing..	Eismn	auto	s&l-2.	opt.	250	l-b.	own.	motor.
Kelly-Springfield K-50	5	4,900	150	own..	p-stl.	flex.	s	36x6	40x6d	wd*	own.	4-4¼x6½-32.4	2	cent.	Fed.	cel-cst.	sing..	Eismn	auto	s&l-2.	opt.	250	l-b.	own.	motor.
Kelly-Springfield K-60	6	5,200	150	own..	p-stl.	flex.	s	36x6	40x7d	wd*	own.	4-4¼x6½-32.4	2	cent.	Fed.	cel-cst.	sing..	Eismn	auto	s&l-2.	opt.	250	l-b.	own.	motor.
Kissel Utility	1½	2,073	152	Smith.	p-stl.	s-flex.	s	34x3½	34x5	wd..	own.	4-3¾x5½-24.2	4	cent.	Fed.	sq-t-sht.	sing..	Eismn	hand.	s&l.		150	cent.	Pierce.	motor.
Kissel Freighter	2	2,832	168	Smith.	p-stl.	rigid.	s	34x4	36x7	wd..	own.	4-4¼x5½-29.0	4	cent.	Mayo	sq-t-sht.	sing..	Eismn	hand.	s&l.		150	cent.	Pierce.	motor.
Kissel Heavy Duty	3½	3,905	168	Smith.	p-stl.	rigid.	s	36x5	36x5d	wd..	own.	4-4¼x5½-29.0	4	cent.	Mayo	sq-t-sht.	sing..	Eismn	hand.	s&l.		150	cent.	Pierce.	motor.
Kissel Dreadnaught	5	4,785	180	Smith.	p-stl.	rigid.	s	36x6	36x6d	wd..	own.	4-4¼x5½-29.0	4	cent.	Mayo	sq-t-sht.	sing..	Eismn	hand.	s&l.		150	cent.	Pierce.	motor.
Kleiber AA	1	2,400	130	own..	rol-c.	s-flex.	s	34x3½	34x5	wd..	Con.	4-3¾x5½-22.5	4	cent.	Per.	cel-sht.	dual.	Bosch.	hand.				cent.	Pierce.	motor.
Kleiber A	1½	2,650	140	own..	rol-c.	s-flex.	s	36x3½	36x6	wd..	Con.	4-4¼x5½-27.2	4	cent.	Per.	cel-sht.	dual.	Bosch.	hand.				cent.	Pierce.	motor.
Kleiber BB	2	2,950	140	own..	rol-c.	s-flex.	s	36x4	36x3½d	wd..	Con.	4-4¼x5½-29.0	4	cent.	Per.	cel-sht.	dual.	Bosch.	hand.				cent.	Pierce.	motor.
Kleiber B	2½	3,500	150	own..	rol-c.	s-flex.	s	36x4	36x4d	wd..	Con.	4-4¼x5½-32.4	2	cent.	Per.	cel-sht.	dual.	Bosch.	hand.				cent.	Pierce.	motor.
Kleiber C	3½	4,100	158	own..	rol-c.	s-flex.	s	36x5	36x5d	wd*	Con.	4-4¼x5½-32.4	2	cent.	R-T.	fin-pst.	dual.	Bosch.	hand.				cent.	Pierce.	motor.
Kleiber D	5	5,100	170	own..	rol-c.	s-flex.	s	36x6	40x6d	c-s.	Con.	4-5½x5½-44.2	2	cent.	R-T.	fin-cst.	dual.	Bosch.	hand.				cent.	Pierce.	motor.
Knox 35	5–10	5,500	108‖		rol-c.	rigid.	s	36x4	38x6d	c-s.	own.	4-5 x5½-40.0	2	cent.	Fed.	cel-sht.	sing..	Eismn	hand.	s&i-2.	Bijur.		none.	none.	none.
Knox 36	10	6,000	108‖		rol-c.	rigid.	s	36x5	38x6d*	c-s.	own.	4-5 x5½-40.0	2	cent.	Fed.	cel-sht.	sing..	Eismn	hand.	s&i-2.	Bijur.		none.	none.	none.
Koehler K	1½	1,450	129	own..	rol-c.	s-flex.	s	34x3	34x4	wd..	own.	4-3½x5 -19.6	4	ther.	own.	fin-cst.	sing..	Eismn	fix.	none.	none.	none	sue.	Mnrch.	motor.
Koehler L	2½	1,985	152	own..	rol-c.	s-flex.	s	34x4	34x6	wd..	own.	4-3½x5 -19.6	4	ther.	own.	fin-cst.	sing..	Eismn	fix.	none.	none.	none	sue.	Mnrch.	motor.
Koehler Tractor KT	3	1,750	106	own..	rol-c.	s-flex.	s	34x3	34x5	wd..	own.	4-3½x5 -19.6	4	ther.	own.	fin-cst.	sing..	Eismn	fix.	none.	none.	none	sue.	Mnrch.	motor.
Koehler Tractor LT	5	2,165		own..	rol-c.	s-flex.	s	34x4	34x6	wd..	own.	4-3½x5 -19.6	4	ther.	own.	fin-cst.	sing..	Eismn	fix.	none.	none.	none	sue.	Mnrch.	motor.
LaFrance (Ward) 3A	3	3.925	154	own	p-stl.	flex.	s	36x4	36x4d	wd..	Con.	4-4½x5½-27.2	4	cent		fin-c-a	sing..	Conn..	hand.	s&l-2.	Dneto.	none	cent..	Simplex	motor.
LaFrance (Ward) 2-A	2	3,500	154	own	p-stl.	flex.	s	36x4	36x7	wd..	Con.	4-4½x5½-27.2	4	cent	Bush.	fin-c-a.	sing..	Conn..	hand.	s&l-2.	Dneto	none	cent..	Simplex	motor.
Lane G	1½	2,250	135				s	34x3½	34x5		Con.	4-3¾x5 -22.5	4				sing..	Eismn	hand.				cent..	Pierce.	motor.
Lane H	2½	2,850	150				s	34x4	36x6		Con.	6-3½x5½-29.4	6				sing..	Eismn	hand.				cent..	Pierce.	motor.
Lane K	3½	3,700	160				s	36x5	36x5d		Con.	6-3½x5½-33.7	6				sing..	Eismn	hand.				cent..	Pierce.	motor.
Lange B	2	2,950	136	own..	rol-c.	rigid.	s	36x4	36x6	wd..	Con.	4-4½x5½-27.2	4	ther.		sq-t-sht.	sing.	Bosch.	hand.				cent..	Pierce.	motor.
Lapeer Tractor 3	3	1,903	90					34x3½	34x5		Wau.	4-3¼x5½-19.6	4				sing..	Dixie.	fix.				cent..	Wau.	motor.
Lapeer Tractor 5	5	2,500	90				s	34x3½	34x3½d		Wau.	4-4¼x5½-27.2	4				sing..	Dixie.	fix.				cent..	Wau.	motor.
Larrabee M	1	1,950	130	Dtrt.	p-stl.	s-flex.	s	34x3½	34x5	wd..	Con.	4-3¾x5 -22.5	4	ther.	Bush.	fin-cst.	sing..	Bosch.	hand.				cent..	Pierce.	motor.
Larrabee C-D	2½	3,000	154	Savg.	p-stl.	s-flex.	s	36x4	36x7	wd..	Con.	4-4½x5½-27.2	4	cent.	Bush.	fin-cst.	sing..	Bosch.	hand.				cent..	Pierce.	motor.
Larrabee A	3½	3,950	172	Savg.	p-stl.	s-flex.	s	36x5	36x5d	wd..	Con.	4-4½x5½-32.4	2	cent.	Bush.	fin-cst.	sing.	Bosch.	hand.				cent.	Pierce.	motor.
Larrabee T	5	4,750	176	Savg.	p-stl.	s-flex.	s	36x5	40x6d	c-s.	Con.	4-4½x5½-32.4	2	cent.	Bush.	fin-cst.	sing.	Bosch.	hand.				cent.	Pierce.	motor.
Lippard-Stewart C	¾	1,900	125	P&B.	p-stl.	s-flex.	pnu.	35x4½	35x4½	wd..	Con.	4-3½x5½-22.5	4	cent.	Fed.	cel-sht.	sing.	Eismn	fix.	s&l.	Dneto.	175	cent.	Pierce.	motor.
Lippard-Stewart H	1	2,250	145	P&B.	p-stl.	flex.	s	36x3	36x5	wd..	Con.	4-3¾x5½-22.5	4	cent.	Fed.	cel-c-a.	sing.	Eismn	fix.	s&l.	Dneto.	175	cent.	Pierce.	motor.
Lippard-Stewart F	1½	2,750	158	P&B.	p-stl.	flex.	s	36x3½	36x3d	wd..	Con.	4-4¼x5½-27.2	4	cent.	Fed.	cel-c-a.	sing.	Eismn	fix.	s&l.	Dneto.	175	cent.	Pierce.	motor.
Lippard-Stewart G	2	3,050	158	P&B.	p-stl.	flex.	s	36x4	36x4d	wd..	Con.	4-4¼x5½-27.2	4	cent.	Fed.	cel-c-a.	sing.	Eismn	fix.	s&l.	Dneto.	175	cent.	Pierce.	motor.
Lombard S					rol-c.	s-flex.						6-5½x7 -79.3	2	cent.		fin-sht.			hand.						
Loyal	¾	865	110		p-stl.	flex.	pnu.	32x4	32x4		H-S.	4-3¾x5 -19.6	2	ther.			sing.	A-K.	auto	s&l		none	none		
Loyal Special	¾	1,025	120		p-stl.	flex.	pnu.	32x4	32x4		H-S.	4-3¾x5 -19.6	2	ther.			sing.	A-K.	auto	s&l		none	none		
Maccar L	1½	2,750	150	Prsh.	p-stl.	rigid.	opt.	36x4	36x5	wd..	Con.	4-4½x5½-27.2	4	cent.	own.	fin-cst.	sing..	Bosch.	hand.	none.	none.	none	cent..	Pierce.	motor.
Maccar H	2½	3,300	162	Prsh.	p-stl.	rigid.	s	36x4	36x4d	wd..	Con.	4-4½x5½-32.4	2	cent.	own.	fin-cst.	sing..	Bosch.	hand.	none.	none.	none	cent..	Pierce.	motor.
Maccar M	3½	4,100	174	Prsh.	p-stl.	rigid.	s	36x5	36x5d	wd..	Con.	4-4½x5½-32.4	2	cent.	own.	fin-cst.	sing..	Bosch.	hand.	none.	none.	none	cent..	Pierce.	motor.
Maccar U	5½	5,000	174	Prsh.	p-stl.	rigid.	s	36x5	40x6d	wd..	Wis.	4-5½x5½-45 6	2	cent.	own.	fin-cst.	sing..	Bosch.	hand.	none.	none.	none	cent..	Pierce.	motor.
Mack AB	1	2,400	144*		p-stl.	s-flex.	s	36x4	36x3½d	wd.	own.	4-4 x5 -25.6	2	cent.	own.	cel-sht.	sing..	Spltf.	hand.	opt.	opt.		cent.	own.	motor.
Mack AB	1	2,400	144*		p-stl.	s-flex.	s	36x4	36x3½d	wd.	own.	4-4 x5 -25.6	2	cent.	own.	cel-sht.	sing..	Spltf.	hand.	opt.	opt.		cent.	own.	motor.
Mack AB	1½	2,800	162*		p-stl.	s-flex.	s	36x4	36x3½d	wd.	own.	4-4 x5 -25.6	2	cent.	own.	cel-sht.	sing..	Spltf.	hand.	opt.	opt.		cent.	own.	motor.
Mack AB	1½	2,800	162*		p-stl.	s-flex.	s	36x4	36x3½d	wd.	own.	4-4 x5 -25.6	2	cent.	own.	cel-sht.	sing..	Spltf.	hand.	opt.	opt.		cent.	own.	motor.
Mack AB	2	3,000	162*		p-stl.	s-flex.	s	36x4	36x4d	wd.	own.	4-4 x5 -25.6	2	cent.	own.	cel-sht.	sing..	Spltf.	hand.	opt.	opt.		cent.	own.	motor.

ABBREVIATIONS—Types of Construction

*Other Options
amid—amidships
auto—automatic
bevl—bevel
c—center
c&l—center and left
c&s—cushion and solid
cent—centrifugal
c-s—cast steel
c-a—cast aluminum
cel-cst—cellular core, cast case
cel-pst—cellular core, pressed steel case
cel-sht—cellular core, sheet case
chn—chain
cylinders cast, 2 in pairs
cylinders cast, 4 in block
cylinders cast, 3 in threes
cylinders cast, 1 singly
d-d—dry disk
d-p—dry plat
d-rd—double reduction
d-s—driveshaft
elec—electric
ext-d-s—external driveshaft
ext-f-w—external front wheels
ext-g—external gear
ext-jst—external jackshaft
ext-r-w—external rear wheel
fab—fabric
fin—finned tube
fin-c-a—finned tube core, cast aluminum case
fin-cst—finned tube core, cast case
fin-pst—finned tube core, pressed steel case
fin-sht—finned tube core, sheet case
fix—fixed
flex—flexible
fric—friction
g.p.—gear pump
grav—gravity
gset—gearset
hyd—hydraulic
ind-c—individual clutch
int-d-s—internal drive-shaft
int-f-w—internal front wheels
in-g—internal gear
in-g-4—internal gear drive on 4 wheels
int-r-w—internal rear wheel
jst—unit with jackshaft
l—left
l&c—left and center
leat—leather
l-b—loose ball
ltg—lighting
metl—metal
mtr—unit with motor
opt—optional
p—plate in oil
pist—piston pump
plan—planetary
pnu—pneumatic
pres—pressure
prog—progressive sliding gearset
p-t-c-a—plain tube core, cast aluminum case
p-t-cst—plain tube core, cast case
p-stl—pressed steel
p&s—pneumatic and solid
r—right
r-ax—unit with rear axle
rng-cst—ring core, cast case
rol-c—rolled channel
rol-i—rolled I-beam
r-rd—radius rods
selec—selective sliding gear
s-flex—semi-flexible
stg—starting
s&l—starting and lighting
s,l&i—starting, lighting and ignition
s l&i2—starting, lighting and ignition, two-unit
sing—single
s—solid
s&c—solid and cushion
spgs—springs
sq-t-cst—square tube core, cast iron
sq-t-sht—square tube core, sheet case
stk—stock
sub-f—sub-frame
suc—suction
s-bev—spiral bevel
ther—thermo-syphon
tor-a—torque arm
t-t—torsion tube
unt-x—unit with axle
vacm—vacuum
wd—wood
w-d—multiple disk in oil
worm—top worm
w-p—wet plate
zz-t-cst—zig zag tube core, cast case
zz-t-pst—zig zag tube core, pressed steel case
zz-t-sht—zig-zag tube core, sheet case

Gasoline Motor Trucks for 1919—Continued

ENGINE				TRANSMISSION										BRAKES		CONTROL			UNIVERSALS		
SPEED		FUEL SYS.		CLUTCH		GEARSET				FINAL DRIVE						STEERING GEAR					
Motor in R.p.m.	Truck in M.p.h.	Carbureter, Make	Fuel Feed	Type	Make	Type	Make	Placed	Speeds	Type	Axle Make	Total Gear Reduction	Propulsion Taken By	Torque Taken By	Springs, Make	Foot	Hand	Placed	Make	Levers	Type	Make	Name and Mode
1,250	20	Stmbg..	grav..	d-p....	.....	selec...	.....	amid..	3	worm..	own....	6.5	r-rd....	spgs...	.....	int-r-w.	int-r-w.	l....	.....	c....	metl..	.....	Indiana.....T
1,160	19	Stmbg..	grav..	d-p....	B-Beck.	selec...	B-Lipe.	amid..	4	worm..	Shel...	6.5	r-rd....	spgs...	Dtrt...	int-r-w.	int-r-w.	l....	Wol...	c....	fab....	Acme..	Indiana.....Q
1,160	16	Stmbg..	grav..	d-p....	B-Beck.	selec...	B-Lipe.	amid..	4	worm..	Shel...	7.75	r-rd....	spgs...	Dtrt...	int-r-w.	int-r-w.	l....	Wol...	c....	metl..	Acme..	Indiana.....D
1,160	12	Stmbg..	grav..	d-p....	B-Beck.	selec...	B-Lipe.	amid..	4	worm..	Shel...	10.25	r-rd....	spgs...	Dtrt*..	int-r-w.	int-r-w.	l....	Wol...	c....	metl..	Spicer.	Indiana.....R
800	11	Stmbg..	grav..	d-p....	B-Beck.	selec...	B-Lipe.	amid..	4	worm..	Shel...	8.75	r-rd....	spgs...	Dtrt*..	int-r-w.	int-r-w.	l....	Wol...	c....	metl..	Spicer.	Indiana.....L
1.150	14	Zenith..	grav..	d-d....	Fuller..	selec...	Fuller..	mtr....	3	in-g...	Clark..	8	spgs...	spgs...	Dtrt...	ext-r-w.	int-r-w.	l	Jacox.	c....	metl..	Arvac..	Jumbo.....A
.....	.....	Carter..	grav..	d-d....	Mech..	selec...	Mech..	mtr....	.....	bevl...	Peru...	.....	.....	.....	.....	.....	.....	.....	Lavn..	.....	.....	.....	Kearns.....
.....	.....	.....	.....	d-p....	B-Beck.	.....	G-Lees.	.....	.....	.....	Hayes..	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Kearns.....
1,400	17.3	Zenith..	grav..	cone...	own....	selec...	Cover..	amid..	3	chn....	own....	8.66	r-rd....	spgs...	Perf...	int-r-w.	int-r-w.	l....	Gem..	c....	metl..	own...	Kelly-Springfield..K-31
1,400	17.3	Zenith..	grav..	cone...	own....	selec...	Cover..	amid..	3	worm..	own....	8.66	r-rd....	spgs...	Perf...	int-r-w.	int-r-w.	l....	Gem..	c....	metl..	Spicer.	Kelly-Springfield..K-32
1,400	14.1	Zenith..	grav..	cone...	own....	selec...	Cover..	amid..	3	chn....	own....	10.64	r-rd....	spgs...	Perf...	int-r-w.	int-r-w.	l....	Gem..	c....	metl..	own...	Kelly-Springfield..K-35
1,400	14.5	Zenith..	grav..	cone...	own....	selec...	Cover..	amid..	3	worm..	own....	10.33	r-rd....	spgs...	Perf...	int-r-w.	int-r-w.	l....	Gem..	c....	metl..	Spicer.	Kelly-Springfield..K-36
1,400	15.7	Rayfld.	grav..	cone...	own....	selec...	Cover..	amid..	3	chn....	own....	10.48	r-rd....	spgs...	Perf...	int-r-w.	int-r-w.	l....	Gem..	c....	metl..	own...	Kelly-Springfield..K-40
1,400	15.5	Rayfld.	grav..	cone...	own....	selec...	Cover..	amid..	3	chn....	own....	10.71	r-rd....	spgs...	Perf...	int-r-w.	int-r-w.	l....	Gem..	c....	metl..	own...	Kelly-Springfield..K-45
1,400	13.6	Rayfld.	grav..	cone...	own....	selec...	Cover..	amid..	3	chn....	own....	12.24	r-rd....	spgs...	Perf...	int-r-w.	int-r-w.	l....	Gem..	c....	metl..	own...	Kelly-Springfield..K-50
1,400	13.4	Rayfld.	grav..	cone...	own....	selec...	Cover..	amid..	3	chn....	own....	12.39	r-rd....	spgs...	Perf...	int-r-w.	int-r-w.	l....	Gem..	c....	metl..	own...	Kelly-Springfield..K-60
1,100	17	Stmbg..	vacm..	d-d....	Warner	selec...	Warner	mtr....	3	worm..	Shel...	6.5	spgs...	spgs...	Mthr...	int-r-w.	int-r-w.	l....	Jacox	c....	metl..	Spicer.	Kissel.....Utility
1,190	15	Stmbg..	vacm..	d-d....	Warner	selec...	Warner	amid..	4	worm..	Timkn.	8.5	spgs...	spgs...	Mthr...	int-r-w.	int-r-w.	l....	Lavn..	c....	metl..	Spicer.	Kissel.....Freighter
1,315	12	Stmbg..	vacm..	d-d....	Warner	selec...	Warner	amid..	4	worm..	Shel...	11.75	spgs...	spgs...	Shel...	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Spicer.	Kissel.....Heavy Duty
1,335	11	Stmbg..	vacm..	d-d....	Warner	selec...	Warner	amid..	4	worm..	Shel...	13.1	spgs...	spgs...	Shel...	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Spicer.	Kissel.....Dreadnaught
1,200	20	Stmbg..	grav..	d-d....	B-Lipe.	selec...	B-Lipe.	mtr....	3	worm..	Timkn.	7	spgs...	spgs...	Betts..	ext-r-w.	int-r-w.	r....	Ross..	c....	metl..	Spicer.	Kleiber.....AA
1,200	15	Stmbg..	grav..	w-d....	H-Shaw	selec...	B-Lipe.	amid..	3	worm..	Shel...	7.75	spgs...	spgs...	Betts..	ext-r-w.	int-r-w.	r....	Ross..	c....	metl..	Spicer.	Kleiber.....A
1,200	15	Stmbg..	grav..	w-d....	H-Shaw	selec...	B-Lipe.	amid..	3	worm..	Timkn.	7.75	spgs...	spgs...	Betts..	int-r-w.	int-r-w.	r....	Ross..	c....	metl..	Spicer.	Kleiber.....BB
1,200	13	Stmbg..	grav..	w-d....	H-Shaw	selec...	B-Lipe.	amid..	4	worm..	Shel...	9	spgs...	spgs...	Betts..	int-r-w.	int-r-w.	r....	Ross..	c....	fab....	Spicer.	Kleiber.....B
1,200	11	Stmbg..	grav..	w-d....	H-Shaw	selec...	B-Lipe.	amid..	4	worm..	Timkn.	10.5	spgs...	spgs...	Betts..	int-r-w.	int-r-w.	r....	Ross..	c....	metl..	Spicer.	Kleiber.....C
1,000	9.5	Stmbg..	grav..	w-d....	H-Shaw	selec...	B-Lipe.	amid..	4	worm..	Timkn.	11.66	spgs...	spgs...	Betts..	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Spicer.	Kleiber.....D
.....	.....	Zenith..	vacm..	d-p....	own....	selec...	own....	jst....	3	chn....	Timkn.	9.6	r-rd....	.....	Penn...	ext-j-s.	int-r-w.	l....	Ross..	c....	metl..	own...	Knox.....35
.....	.....	Zenith..	vacm..	d-p....	own....	selec...	own....	jst....	3	chn....	Timkn.	12	r-rd....	.....	Penn...	ext-j-s.	int-r-w.	l....	Ross..	c....	metl..	own...	Knox.....36
1,000	20	Stmbg..	grav..	d-d....	Mech..	selec...	Mech..	mtr....	3	in-g...	Torbn..	7	spgs...	spgs...	.....	ext-r-w.	int-r-w.	l....	own..	c....	metl..	K-B...	Koehler.....K
1,000	18	Stmbg..	grav..	d-d....	Mech..	selec...	Mech..	mtr....	3	in-g...	Torbn..	9	spgs...	spgs...	.....	ext-r-w.	int-r-w.	l....	own..	c....	metl..	K-B...	Koehler.....L
1,000	16	Stmbg..	grav..	d-d....	Mech..	selec...	Mech..	mtr....	3	in-g...	Torbn..	8	spgs...	spgs...	.....	ext-r-w.	int-r-w.	l....	own..	c....	metl..	K-B...	Koehler Tractor.....KT
1,000	14	Stmbg..	grav..	d-d....	Mech..	selec...	Mech..	mtr....	3	in-g...	Torbn..	10	spgs...	spgs...	.....	ext-r-w.	int-r-w.	l....	own..	c....	metl..	K-B...	Koehler Tractor.....LT
1,250	16	Zenith..	grav..	d-p....	B-Beck.	selec...	B-Lipe.	amid..	4	worm..	.....	8.5	r-rd....	spgs...	Stand..	int-r-w.	int-r-w.	r....	Ross..	c....	metl*	Hart...	LaFrance (Ward)....3-A
1,250	16	Zenith..	grav..	d-p....	B-Beck.	selec...	B-Lipe.	amid..	4	worm..	Timkn.	8.5	r-rd....	spgs...	Stand..	int-r-w.	int-r-w.	r....	Ross..	c....	metl*	Hart...	LaFrance (Ward)....2-A
1,200	18	Stmbg..	vacm..	d-d....	Fuller.	selec...	Fuller.	mtr....	3	worm..	.....	7.2	spgs...	spgs...	Kal....	int-r-w.	int-r-w.	.....	Ross..	.....	.....	Acme..	Lane.....G
1,100	18	Stmbg..	vacm..	d-p....	B-Beck.	selec...	Cover..	amid..	3	worm..	Timkn.	7.7	spgs...	spgs...	Kal....	int-r-w.	int-r-w.	.....	Ross..	.....	.....	Acme..	Lane.....H
1,100	13	Stmbg..	vacm..	d-p....	B-Beck.	selec...	Cover..	amid..	3	worm..	Shel...	8.7	spgs...	spgs...	Kal....	int-r-w.	int-r-w.	.....	Ross..	.....	.....	Acme..	Lane.....K
1,250	15	Stmbg..	grav..	w-d....	H-Shaw	ind-c...	own....	amid..	3	chn....	own....	9	r-rd....	.....	Stand..	ext-r-w.	int-r-w.	l....	Gem..	c....	metl..	M-E...	Lange.....B
1,000	12	Stewrt.	grav..	d-d....	Fuller.	selec...	Fuller.	mtr....	3	in-g...	Torbn.	10	spgs...	spgs...	.....	ext-r-w.	int-r-w.	.....	Ross..	.....	.....	.....	Lapeer Tractor.....3
1,000	8	Stewrt.	grav..	d-d....	Fuller.	selec...	Fuller.	mtr....	3	in-g...	Torbn.	13	spgs...	spgs...	.....	ext-r-w.	int-r-w.	.....	Ross..	.....	.....	.....	Lapeer Tractor.....5
1,200	15	Stmbg..	grav..	d-d....	B-Lipe.	selec...	B-Lipe.	amid..	4	worm..	Shel...	8.75	spgs...	spgs...	Merl...	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Univ...	Larrabee.....M
1,200	18	Schblr.	grav..	d-d....	Fuller.	selec...	Fuller.	mtr....	3	worm..	Shel...	6.5	spgs...	spgs...	Merl...	ext-r-w.	int-r-w.	l....	Lavn..	c....	metl..	Univ...	Larrabee.....C-D
1,000	12	Stmbg..	grav..	d-d....	B-Lipe.	selec...	B-Lipe.	amid..	4	worm..	Shel...	....	spgs...	spgs...	Merl...	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Univ...	Larrabee.....A
1,000	10	Stmbg..	grav..	d-d....	B-Lipe.	selec...	B-Lipe.	amid..	4	worm..	Shel...	.....	spgs...	spgs...	Merl...	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	M-E...	Larrabee.....T
1,200	25	Zenith..	grav..	cone...	Hart...	selec...	B-Lipe.	amid..	3	s-bev..	Timkn.	5.08	spgs...	spgs...	Mthr...	ext-r-w.	int-r-w.	l....	Ross..	c....	metl..	Spicer.	Lippard-Stewart.....C
1,125	17	Zenith..	grav..	cone...	Hart...	selec...	B-Lipe.	amid..	3	worm..	Timkn.	7	spgs...	spgs...	Mthr...	ext-r-w.	int-r-w.	l....	Ross..	c....	metl..	Spicer.	Lippard-Stewart.....H
1,100	15	Zenith..	grav..	cone...	Hart...	selec...	B-Lipe.	amid..	3	worm..	Timkn.	7.75	spgs...	spgs...	Mthr...	ext-r-w.	int-r-w.	l....	Ross..	c....	metl..	Spicer.	Lippard-Stewart.....F
1,225	14	Zenith..	grav .	cone...	Hart...	selec...	B-Lipe.	amid..	3	worm..	Timkn.	9.25	spgs...	spgs...	Mthr...	ext-r-w.	int-r-w.	l....	Ross..	c....	metl..	Spicer.	Lippard-Stewart.....G
1,400	6	Stmbg..	pres ..	w-d....	.....	ind-c...	.....	amid..	3	worm..	.....	.....	.....	.....	.....	.....	.....	l....	.....	c....	.....	.....	Lombard.....5
.....	25	Stmbg..	grav..	d-p....	B-Beck.	selec...	Cover..	mtr....	3	in-g...	Torbn..	.....	spgs...	spgs...	.....	int-r-w.	ext-r-w.	.....	.....	c....	.....	.....	Loyal.....
.....	25	Stmbg..	grav..	d-p....	B-Beck.	selec...	Cover..	mtr....	3	in-g...	Torbn..	.....	spgs...	spgs...	.....	int-r-w.	ext-r-w.	.....	.....	c....	.....	.....	Loyal Special.....
1,000	17	Stmbg..	grav..	d-d....	B-Lipe.	selec...	B-Lipe.	mtr....	3	worm..	Timkn.	7	r-rd....	spgs...	Merl...	int-r-w.	int-r-w.	l....	Ross..	l&c..	metl..	Spicer.	Maccar.....L
1,000	15	Stmbg..	grav..	d-d....	B-Lipe.	selec...	B-Lipe.	mtr....	3	worm..	Timkn.	7.75	r-rd....	spgs...	Merl...	int-r-w.	int-r-w.	l....	Ross..	l&c..	metl..	Spicer.	Maccar.....H
1,000	15	Stmbg..	grav..	d-d....	B-Lipe.	selec...	B-Lipe.	mtr....	3	worm..	Timkn.	8.75	r-rd....	spgs...	Merl...	int-r-w.	int-r-w.	l....	Ross..	l&c..	metl..	Spicer.	Maccar.....M
1,000	12	Stmbg..	grav..	d-d....	B-Lipe.	selec...	B-Lipe.	amid..	4	worm..	Timkn.	10.25	r-rd....	spgs...	Merl...	int-r-w.	int-r-w.	l....	Ross..	l&c..	metl..	Spicer.	Maccar.....U
1,275	.....	Stmbg*	grav..	d-d....	B-Lipe.	selec...	B-Lipe.	mtr....	4	worm..	Timkn.	7.75	spgs...	spgs...	Mthr...	ext-d-s.	int-r-w.	l....	Gem..	c....	.....	.....	Mack.....AB
1,275	.....	opt...	grav..	d-d....	B-Lipe.	selec...	B-Lipe.	mtr....	4	chn....	own....	6.29	r-rd....	tor-a..	Mthr...	int-r-w.	int-d-s.	l....	Gem..	c....	.....	.....	Mack.....AB
1,275	.....	Stmbg*	grav..	d-d....	B-Lipe.	selec...	B-Lipe.	mtr....	4	worm..	Timkn.	8.5	spgs...	spgs...	Mthr...	int-r-w.	int-r-w.	l....	Gem..	c....	.....	.....	Mack.....AB
1,275	.....	Stmbg*	grav..	d-d....	B-Lipe.	selec...	B-Lipe.	mtr....	4	chn....	Timkn.	6.99	r-rd....	.....	Mthr...	ext-d-s.	int-r-w.	l....	Gem..	c....	.....	.....	Mack.....AB
1,275	.....	Stmbg*	grav..	d-d....	B-Lipe.	selec...	B-Lipe.	mtr....	4	worm..	Timkn.	8.5	spgs...	spgs...	Mthr...	int-r-w.	int-r-w.	l....	Gem..	c....	.....	.....	Mack.....AB

ABBREVIATIONS—Makers of Parts

*Other Options
A-K—Atwater-Kent
Al-Ch—Allis-Chalmers
Aut-L—Auto-Lite
B-Beck—Borg & Beck
B-Lipe—Brown-Lipe
Blng—Berling
Brem—Bremer
Can—Candler
Cant—Canton-Cleveland
CAS—C.A.S. Products Co.
Champ—Champion Spng.
Chcgo—Chicago-Stndrd
Chgo—Chicago Mfg. Co.
Con—Continental
Conn—Connecticut
Cover—Covert
Del—Delany
Ditw—Ditweiler
Dneto—Dyneto
Dtrt—Detroit Press. Stl.
Dtrt—Detroit Lubricat.
Dtrt—Detroit G. & M. Co.
Dtrt—Detroit Stl. Spng.
Duplx—Duplex
E&M—English & Mersick
Eismn—Eisemann
Emp—Empire
Ens—Ensign
Eur—Eureka
Fed—Fedders
Flech—Fletcher
Fost—Foster
Franck—Francke
G&D—Gray & Davis
G&O—G. & O. Mfg. Co.
GBS—Golden, Belknap & Swartz
G-Lees—Grant-Lees
Gem—Gemmer
H&N—H. & N. Carburetor Co.
Har—Harrison
Hart—Hartford
Hays—Hayes
Her—Hercules
Hig—Higgins
Hol—Holley
H-Shaw—Hele-Shaw
H-S—Herschell-Spillman
Hyd—Hydraulic
Idl—Ideal
Ind—Industrial Equipment Co.
Iron—Iron City
J-A—Jackson Radiator Wks.
Jacox—Jackson-Church-Wilcox
Jas—Jamestown Car Pts. Co.
Jhnson—Johnson
Kal—Kalamazoo
K-B—Kinsler-Bennett
Key-H—Keystone-Hindley
King—Kingston
Koko—Kokomo
Lau—Lauraine
Lavn—Lavine
LeR—LeRoi
Lgt—Light Foundry
Ligt—Liggett
L-N—Leece Neville
Lyc—Lycoming
Marvl—Marvel
Mast—Master
McC—McCord
McFar—McFarland
Mech—Mechanics
Merl—Merrill
Mil—Milwaukee
Mrch—Monarch
Mod—Modine
Mthr—Mather
M&E—Merchant & Evans
Natl—National
N.A.—North American
N-E—North East
Nlite—Nicolite
Penn—Penn Spring Co.
P&B—Parish & Bingham
Per—Perfex
Perf—Perfection
Prsh—Parish
R-T—Rome-Turney
Rayfld—Rayfield
Rem—Remy
Rowl—Wm. Harvel Rowland
Rugles—Ruggles
Russl—Russel
Rut—Rutenber
Savg—Savage Arms
Salsby—Salisbury
Schblr—Schebler
Shel—Sheldon
Shkspr—Shakespeare
Smth—A. O. Smith
S-P—Spring-Perch
Splf—Splitdorf
Stan—Standard Radiator Co.
Stand—Standard Steel Spring Co.
Stewrt—Stewart
Stlg—Sterling
Stmbg—Stromberg
Sundmn—Sunderman
S-W—Sparks-Withington
Therm—Thermoid
Timkn—Timken
Tltsn—Tillotson
Torbn—Torbenson
Tut—Tuthill
Univ—Universal Machine Co.
Wau—Waukesha
West—Westinghouse
Wis—Wisconsin
Wol—Wohlrab
W-W—Walker-Wem.

Detailed Technical Specifications of

Name and Model	Tons Capacity	Chassis Price	Wheelbase Inches	FRAME			TIRES			Wheels	ENGINE				COOLING			IGNITION			ELEC. SYSTEM			GOVERNOR		
								Size in Ins.								Radiator										
				Make	Material	Type	Kind	Front	Rear		Make	No. Cyl., Bore and Stroke—N.A.C.C. Hp.	Cylinders Cast	Water Circ.	Make	Core and Case	Type	Make	Spark Advance	Type	Make	Extra Cost, $	Type	Make	Drive
Mack	AB	2	3,000	162*	.....	p-stl.	s-flex.	s....	36x4	36x4d	wd..	own..	4-4 x5 -25.6	2	cent...	own..	cel-sht...	sing..	Spltf..	hand.	opt...	opt.....	.....	cent..	own....	motor.
Mack	AC	3½	4,600	180*	.....	p-stl.	s-flex.	s....	36x5	40x5d	wd..	own..	4-5 x6 -40.0	2	cent...	own..	rng-cst.	.....	Spltf..	hand.	opt...	opt.....	.....	cent..	own....	motor.
Mack	AC	5½	5,250	180*	.....	p-stl.	s-flex.	s....	36x6	40x6d	wd..	own..	4-5 x6 -40.0	2	cent...	own..	rng-cst.	.....	Spltf..	hand.	opt...	opt.....	.....	cent..	own....	motor.
Mack Tractor	AC	7	4,600	119	.....	p-stl.	s-flex.	s....	36x5	40x5d	wd..	own..	4-5 x6 -40.0	2	cent...	own..	rng-cst.	.....	Spltf..	hand.	opt...	opt.....	.....	cent..	own....	motor.
Mack	AC	7½	5,500	180*	.....	p-stl.	s-flex.	s....	36x7	40x7d	wd..	own..	4-5 x6 -40.0	2	cent...	own..	rng-cst.	.....	Spltf..	hand.	opt...	opt.....	.....	cent..	own....	motor.
Mack Tractor	AC	11	5,250	119	.....	p-stl.	s-flex.	s....	36x6	40x6d	wd..	own..	4-5 x6 -40.0	2	cent...	own..	rng-cst.	.....	Spltf..	hand.	opt...	opt.....	.....	cent..	own....	motor.
Mack Tractor	AC	15	5,500	119	.....	p-stl.	s-flex.	s....	36x7	40x7d	wd..	own..	4-5 x6 -40.0	2	cent...	own..	rng-cst.	.....	Spltf..	hand.	opt...	opt.....	.....	cent..	own....	motor.
Manly	30	1½	2,050	144	.....	.....	s.	36x4	36x5	....	Wau.	4-3½x5½-22.5	4	.....	.....	.....	sing..	Eismn	fix..	.....	.....	.....	.....	cent..	Wau....	motor.
Manly	40	2	2,350	156	.....	.....	s.	36x4	36x6	....	Wau.	4-3½x5½-22.5	4	.....	.....	.....	sing..	Eismn	fix.	.....	.....	.....	.....	cent..	Wau....	motor.
Manly	50	2½	2,800	156	.....	.....	s.	36x4	40x7	....	Wau.	4-4 x5½-25.6	2	.....	.....	.....	sing..	Eismn	fix.	.....	.....	.....	.....	cent..	Wau....	motor.
Master	M	2	2,390	144	P&B..	p-stl.	s-flex.	s....	34x4	36x7	wd..	Buda	4-4½x5½-29.0	4	cent...	own..	cel-cst...	sing..	Eismn	auto.	.....	West..	150	suc..	McCanna	motor.
Master	O	2	2,490	170	P&B..	p-stl.	s-flex.	s....	34x4	36x7	wd..	Buda	4-4½x5½-29.0	4	cent...	own..	cel-cst...	sing..	Eismn	auto.	opt...	opt....	150	suc..	McCanna	motor.
Master	W	2	2,590	144	P&B..	p-stl.	s-flex.	s....	34x4	36x7	wd..	Buda	4-4½x5½-29.0	4	cent...	own..	cel-cst...	sing..	Eismn	auto.	sl&i...	West..	150	suc..	McCanna	motor.
Master	WL	2	2,690	170	P&B..	p-stl.	s-flex.	s....	34x4	36x7	wd..	Buda	4-4½x5½-29	4	cent...	own..	cel-cst...	sing..	Eismn	auto.	sl&i...	West..	150	suc..	McCanna	motor.
Master	A	3½	3,890	158	P&B..	p-stl.	s-flex.	s....	36x5	40x5d	wd..	Buda	4-4½x6 -32.4	4	cent...	own..	cel-cst...	sing..	Eismn	auto.	l&i...	West..	150	cent..	Pierce...	d-s...
Maxfer		1	1,195	130	P&B..	.....	.....	p&s.	36x4	34x4	.....	.....	4-3½x5 -19.6	4	.....	.....	.....	sing..	Deleo.	.....	s&l..	Deleo.	.....	.....	.....	.....
Maxwell		1	1,025	124	Hyd..	p-stl.	s-flex.	s....	32x3	32x4	wd..	own..	4-3½x4½-21.0	4	ther...	own..	fin-pst...	sing..	A-K..	hand.	ltg...	Aut-L.	none	suc..	own....	motor.
Menominee	Hurryton	1	1,890	130	own...	rol-c.	s-flex.	s....	34x3½	34x5	wd..	Con..	4-3½x5 -22.5	4	ther...	G&O.	cel-sht...	sing..	Eismn	hand.	ltg...	.....	.....	cent..	Pierce...	motor.
Menominee	H	1½	2,475	130	own...	rol-c.	s-flex.	s....	36x3½	36x5	wd..	Con..	4-3½x5½-22.5	4	cent...	G&O.	cel-sht...	sing..	Eismn	hand.	ltg...	.....	.....	cent..	Pierce...	motor.
Menominee	D	2	2,950	144	own...	rol-c.	s-flex.	s....	36x4	36x4d	wd..	Con..	4-4½x5½-27.2	4	cent...	G&O.	fin-cst...	sing..	Eismn	hand.	.....	.....	.....	cent..	Pierce...	motor.
Menominee	G	3½	3,880	160	own...	rol-c.	s-flex.	s....	36x5	36x5d	wd..	Con..	4-4½x5½-32.4	2	cent...	G&O.	fin-cst...	sing..	Eismn	hand.	.....	.....	.....	cent..	Pierce...	motor.
Menominee	J	5	4,950	160	own...	rol-c.	s-flex.	s....	36x6	40x6d	wd..	Con..	4-4½x5½-32.4	2	cent...	G&O.	fin-cst...	sing..	Eismn	hand.	.....	.....	.....	cent..	Pierce...	motor.
Modern	30		1,800	132	.....	.....	s.	34x3½	34x5	....	Con.	4-3½x5 -22.5	4	.....	.....	.....	.....	.....	fix..	.....	.....	.....	.....	.....	opt.....	.....
Moreland	17-N	1	2,175	126	Smith.	p-stl.	s-flex.	s....	34x3½	34x4	wd..	Con..	4-3½x5 -22.5	4	ther...	own..	cel-sht...	sing..	Dixie..	hand.	.....	.....	.....	.....	.....	.....
Moreland	17-B	1½	2,930	150	Smith.	p-stl.	s-flex.	s....	36x3½	36x5	c-s..	Con..	4-4½x5½-27.2	4	cent...	own..	cel-sht...	dual..	Dixie..	hand.	.....	.....	.....	.....	.....	.....
Moreland	17-C	2½	3,500	168	own...	p-stl.	s-flex.	s....	36x4	36x7	c-s..	Con..	4-4½x5½-32.4	2	cent...	McF.	cel-sht...	dual..	Dixie..	hand.	.....	.....	.....	.....	.....	.....
Moreland	17-G	4	4,500	186	own...	p-stl.	s-flex.	s....	36x5	40x5d	c-s..	Wau.	4-4½x6½-36.1	2	cent...	McF.	cel-sht...	dual..	Dixie..	hand.	.....	.....	.....	cent..	Pierce...	motor.
Moreland	17-J	5	5,000	168	own...	p-stl.	s-flex.	s....	36x6	40x6d	c-s..	Wau.	4-4½x6½-36.1	2	cent...	own..	cel-sht...	dual..	Dixie..	hand.	.....	.....	.....	cent..	Wau....	motor.
Muskegon	20	2	2,325	144	P&B..	p-stl.	flex..	s....	36x4	36x6	wd.	Con..	4-4½x5½-27.2	4	cent...	Mayo	cel-cst...	sing..	Eismn	2-pt..	none..	none..	none	cent..	Pierce...	d-s...
Myers	50	1	1,495	130	P&B..	p-stl.	s-flex.	s*...	34x4	34x4	wd.	Lyc..	4-3½x5 -19.6	4	ther...	Stan.	cel-cst...	sing..	Swiss..	hand.	sl&i-2.	Dynt..	none	cent..	Pierce...	gset..
Myers	55	1	1,460	130	P&B..	p-stl.	s-flex.	s*..	34x3½	34x4	wd.	Lyc..	4-3½x5 -19.6	4	ther...	Stan.	cel-cst...	sing..	Delco.	hand.	.....	.....	.....	cent..	Pierce...	gset..
Myers	70	1½	1,750	130	P&B..	p-stl.	s-flex.	s....	34x3½	34x5	wd.	Lyc..	4-3½x5 -19.6	4	ther...	Stan.	cel-cst...	sing..	Delco.	hand.	sl&i-2.	Dynt..	none	cent..	Pierce...	gset..
Myers	75	1½	1,700	130	P&B..	p-stl.	s-flex.	s....	34x3½	34x5	wd.	Lyc..	4-3½x5 -19.6	4	ther...	Stan.	cel-cst...	sing..	Swiss..	hand.	.....	.....	.....	cent..	Pierce...	gset..
Nash	2018	1	1,650	130	Smith.	p-stl.	s-flex.	s....	34x3	34x4	wd.	own.	4-3½x5½-22.5	4	cent...	Long.	fin-cst...	sing..	Conn..	hand.	sl&i-2.	Aut-L.	none	cent..	Duplex..	motor.
Nash	4017	2	3,250	124	Smith.	p-stl.	s-flex.	s....	36x5	36x5	c-s.	Buda	4-4½x5½-29.0	4	cent...	McC.	fin-cst...	sing..	Eismn	hand.	s&l-2..	Bijur..	....	cent..	Duplex..	motor.
Nash	3018	2	2,175	144	Smith.	p-stl.	s-flex.	s*...	34x4	36x5	wd.	own..	4-3½x5½-22.5	4	cent...	Long.	fin-cst...	sing..	Conn..	hand.	sl&i-2.	Aut-L.	none	cent..	Duplex..	motor.
Nelson & LeMoon	F1	1	2,000	opt.	own...	rol-c.	s-flex.	s....	36x3	36x4	wd.	Con..	4-3½x5½-22.5	4	cent...	Chgo	fin-cst...	sing..	Eismn	fix...	s&l...	West..	175	suc..	Mnrch..	motor.
Nelson & LeMoon	F2	2	2,775	opt.	own...	rol-c.	s-flex.	s....	36x4	36x7	wd.	Con..	4-4½x5½-27.2	4	cent...	Chgo	fin-cst...	dual..	Eismn	hand.	s&l...	West..	175	suc..	Mnrch..	motor.
Nelson & LeMoon	F3½	3½	3,750	opt.	own...	rol-c.	s-flex.	s....	36x5	36x5d	wd.	Con..	4-4½x5½-32.4	2	cent...	Chgo	fin-cst...	dual..	Eismn	hand.	s&l...	West..	175	suc..	Mnrch..	motor.
Nelson & LeMoon	F5	5	4,750	opt.	own...	rol-c.	s-flex.	s....	36x6	40x6d	wd.	Buda	4-4½x6 -32.4	4	cent...	Chgo	fin-cst...	dual..	Eismn	hand.	s&l...	West..	175	suc..	Mnrch..	motor.
Netco	D	2	2,500	144	Prsh..	p-stl.	rigid.	s....	36x4	36x6	wd.	Con..	4-4½x5½-27.2	4	cent...	R-T..	fin-cst...	sing..	Eismn	fix...	none..	none..	.....	.....	.....	.....
Niles	B	1	1,500	124	.....	.....	.....	pnu.	35x5	35x5	....	Con.	4-3½x5 -19.6	4	.....	.....	.....	sing..	Eismn	hand.	.....	.....	.....	cent..	Pierce...	motor.
Niles	E	2	2,400	140	.....	.....	.....	s....	36x4	36x7	....	Con.	4-4½x5½-27.2	4	.....	.....	.....	sing..	Eismn	hand.	.....	.....	.....	cent..	Pierce...	motor.
Noble	NW2	2½	2,675	148	Dtrt..	p-stl.	s-flex.	s....	36x4	36x7	wd.	Con.	4-4½x5½-27.2	4	cent...	Long.	fin-cst...	sing..	Eismn	hand.	ltg...	Remy.	45	cent..	Pierce...	motor.
Noble	NW4	4	3,750	168	own...	rol-c.	s-flex.	s....	36x5	36x5d	p-st.	Con.	4-4½x5½-32.4	2	cent...	Long.	fin-cst...	sing..	Eismn	hand.	ltg...	Remy.	50	cent..	Pierce...	motor.
Norwalk	2000	1	1,495	130	P&B..	p-stl.	flex..	pnu*	34x4	34x4	wd.	Lyc.	4-3½x5 -19.6	4	ther...	Stan.	cel-pst...	sing..	Delco.	hand.	sl&i-2.	Dynt..	none	ther..	none....	.....
Norwalk	3000	1½	1,750	130	P&B..	p-stl.	flex..	opt...	34x4	34x5	wd.	Lyc	4-3½x5 -19.6	4	ther...	Stan.	cel-pst...	sing..	Delco.	hand.	sl&i-2.	Dynt..	none	none.	none....	.....
O.K.	3T	1½	2,250	150	P&B..	p-stl.	s-flex.	s....	36x4	36x5	wd.	Buda	4-4½x5½-27.2	4	cent...	.....	fin-cst...	sing..	Eismn	fix...	none..	none..	none	cent..	Pierce...	motor.
O.K.	1T	3	2,985	158	Savg..	p-stl.	s-flex.	s....	36x4	36x7	wd.	Buda	4-4½x5½-29.0	4	cent...	Chgo	fin-cst...	sing..	Eismn	fix...	none..	none..	none	cent..	Pierce...	motor.
Old Hickory	M	¾	995	112	own...	rol-c.	s-flex.	pnu.	33x4	33x4	wd.	Lyc.	4-3½x5 -16.9	4	ther...	Can..	cel-pst...	sing..	Conn..	hand.	sl&i...	Dynt.	none	.....	.....	.....
Old Reliable	WA	1½	2,350	150	Savg..	p-stl.	s-flex.	s....	34x3½	36x6	wd.	Wis.	4-4 x5 -25.6	4	cent...	Chgo	fin-cst...	sing..	Bosch.	hand.	ltg...	opt....	50	suc..	Mnrch..	motor.
Old Reliable	WB	2½	3,250	160	own...	rol-c.	s-flex.	s....	34x4	36x4d	wd.	Wis.	4-4½x6 -29.0	4	cent...	Chgo	fin-cst...	sing..	Bosch.	hand.	ltg...	opt....	50	suc..	Mnrch..	motor.
Old Reliable	WC	3½	4,000	160	own...	rol-c.	rigid.	s....	34x5	36x5d	wd.	Wis.	4-4½x6 -29.0	4	cent...	Chgo	cel-sht...	sing..	Bosch.	hand.	ltg...	opt....	50	suc..	Mnrch..	motor.
Old Reliable	WD	5	5,000	166	own...	rol-c.	rigid.	s....	36x5	40x6d	wd.	Wau*	4-4½x6½-36.1	2	cent...	Chgo	fin-cst...	sing..	Bosch.	hand.	ltg...	opt....	50	suc..	Mnrch..	motor.
Old Reliable	CO	5	5,000	126	own...	rol-c.	rigid.	s....	36x6	36x6d	wd.	Wis.	4-4½x5½-36.1	2	cent...	Chgo	fin-cst...	sing..	Bosch.	hand.	none.	none..	none	cent..	Duplex..	motor.
Old Reliable	CP	7	6,000	136	own...	rol-c.	rigid.	s....	36x6	40x7d	wd*	Wau.	4-4½x6½-36.1	2	cent...	Chgo	fin-cst...	sing..	Bosch.	hand.	none.	none..	none	cent..	Wau....	motor.
Oneida	A	1	2,290	130	Smith.	p-stl.	s-flex.	s*..	36x3½	36x5	wd.	Con..	4-3½x5½-22.5	4	cent...	Long.	fin-cst...	sing..	Bosch.	hand.	ltg...	West..	.....	cent..	Pierce...	motor.
Oneida	B	1½	2,650	130	Smith.	p-stl.	s-flex.	s*..	36x3½	36x6	wd.	Con..	4-4½x5½-27.2	4	cent...	Long.	fin-cst...	sing..	Bosch.	hand.	ltg...	West..	.....	cent..	Pierce...	motor.
Oneida	C	2	3,000	144	Smith.	p-stl.	s-flex.	s*..	36x4	36x7	wd.	Con.	4-4½x5½-27.2	4	cent...	Long.	fin-cst...	sing..	Bosch.	hand.	ltg...	West..	.....	cent..	Pierce...	motor.
Oneida	D	3½	3,700	160	Smith.	p-stl.	s-flex.	s*..	36x5	36x5d	wd.	Con.	4-4½x5½-32.4	2	cent...	Long.	fin-cst...	sing..	Bosch.	hand.	ltg...	West..	.....	cent..	Pierce...	motor.
Oneida	E	5	4,750	170	Smith.	p-stl.	flex..	s....	36x6	40x12	c-s..	Con..	4-5½x5½-44.2	2	cent...	Long.	fin-cst...	sing..	Bosch.	hand.	ltg...	West..	.....	cent..	Pierce...	motor.
Overland	Panel	2/5	835	104	.....	.....	.....	pnu.	31x4	31x4	....	own..	4-3½x5 -18.2	4	ther...	.....	.....	.....	Conn..	hand.	s&l...	Aut-L.	.....	.....	.....	.....
Overland	Express	3/5	1,015	106	.....	.....	.....	pnu.	33x4½	33x4½	....	own..	4-4½x4½-27.2	4	ther...	.....	.....	.....	Conn..	hand.	s&l...	Aut-L.	.....	.....	.....	.....
Packard	E	1	2,650	126	own...	rol-c.	flex..	s*...	34x3½	34x6	wd..	own..	4-4 x5½-25.6	4	cent...	own..	cel-sht...	sing..	Spltf..	hand.	sl&i-2.	Bijur..	180	cent..	own....	motor.
Packard	E	1½	3,000	126	own...	rol-c.	flex..	s*...	34x3½	34x3½d	wd..	own..	4-4 x5½-25.6	4	cent...	own..	cel-sht...	sing..	Spltf..	hand.	sl&i-2.	Bijur..	180	cent..	own....	motor.

ABBREVIATIONS—Types of Construction

*Other Options
amid—amidships
auto—automatic
bevl—bevel
c—center
c&l—center and left
c&s—cushion and solid
cent—centrifugal
c-s—cast steel
c-a—cast aluminum
cel-cst—cellular core, cast case
cel-pst—cellular core, pressed steel case
cel-sht—cellular core, sheet case
chn—chain
cylinders cast, 2 in pairs
cylinders cast, 4 in block
cylinders cast, 3 in threes
cylinders cast, 1 singly
d-d—dry disk
d-p—dry plate
d-rd—double reduction
d-s—driveshaft
elec—electric
ext-d-s—external driveshaft
ext-f-w—external front wheels
ext-g—external gear
ext-jst—external jackshaft
ext-r-w—external rear wheel
fab—fabric
fin—finned tube
fin-c-a—finned tube core, cast aluminum case
fin-cst—finned tube core, cast case
fin-pst—finned tube core, pressed steel case
fin-sht—finned tube core, sheet case
fix—fixed
flex—flexible
fric—friction
g.p.—gear pump
grav—gravity
gset—gearset
hyd—hydraulic
ind-c—individual clutch
int-d-s—internal driveshaft
int-f-w—internal front wheels
in-g—internal gear
in-g-4—internal gear drive on 4 wheels
int-r-w—internal rear wheel
jst—unit with jackshaft
l—left
l&c—left and center
lent—leather
l-b—loose ball
ltg—lighting
metl—metal
mtr—unit with motor
opt—optional
p—plate in oil
pist—piston pump
plan—planetary
pnu—pneumatic
pres—pressure
prog—progressive sliding gearset
p-t-c-a—plain tube core, cast aluminum case
p-t-cst—plain tube core, cast case
p-stl—pressed steel
p&s—pneumatic and solid
r—right
r-ax—unit with rear axle
rng-cst—ring core, cast case
rol-c—rolled channel
rol-i—rolled I-beam
r-rd—radius rods
selec—selective sliding gear
s-flex—semi-flexible
stg—starting
s&l—starting and lighting
s.l&i—starting, lighting and ignition
s l&i2—starting, lighting and ignition, two-unit
sing—single
s—solid
s&c—solid and cushion
spgs—springs
sq-t-cst—square tube core, cast iron
sq-t-sht—square tube core, sheet case
stk—stock
sub-f—sub-frame
suc—suction
s-bev—spiral bevel
ther—thermo-syphon
tor-a—torque arm
t-t—torsion tube
unt-x—unit with axle
vacm—vacuum
wd—wood
w-d—multiple disk in oil
worm—top worm
w-p—wet plate
zz-t-cst—zig zag tube core, cast case
zz-t-pst—zig zag tube core, pressed steel case
zz-t-sht—zig-zag tube core, sheet case

Gasoline Motor Trucks for 1919—Continued

ENGINE						TRANSMISSION										BRAKES		CONTROL			UNIVERSALS		
SPEED		FUEL SYS.		CLUTCH		GEARSET				FINAL DRIVE								STEERING GEAR					
Motor in R.p.m.	Truck in M.p.h.	Carbureter Make	Fuel Feed	Type	Make	Type	Make	Placed	Speeds	Type	Axle Make	Total Gear Reduction	Propulsion Taken By	Torque Taken By	Springs Make	Foot	Hand	Placed	Make	Levers	Type	Make	Name and Model
1,275	.....	Stmbg*	grav	d-d	B-Lipe	selec	B-Lipe	mtr	4	chn	own	6.99	r-rd	.....	Mthr	ext-d-s	int-r-w	l	Gem	c	.....	.....	Mack AB
1,000	.....	Stmbg*	grav	d-p	own	selec	own	amid	3	chn	own	7.45	r-rd	.....	Mthr	ext-j-s	int-r-w	l	Gem	c	.....	.....	Mack AC
1,000	.....	Stmbg*	grav	d-p	own	selec	own	amid	3	chn	own	8.4	r-rd	.....	Mthr	ext-j-s	int-r-w	l	Gem	c	.....	.....	Mack AC
1,000	.....	Stmbg*	grav	d-p	own	selec	own	amid	3	chn	own	10.77	r-rd	.....	Mthr	ext-j-s	int-r-w	l	Gem	c	.....	.....	Mack Tractor AC
1,000	.....	Stmbg*	grav	d-p	own	selec	own	amid	3	chn	own	11.58	r-rd	.....	Mthr	ext-j-s	int-r-w	l	Gem	c	.....	.....	Mack AC
1,000	.....	Stmbg*	grav	d-p	own	selec	own	amid	3	chn	own	11.5	r-rd	.....	Mthr	ext-j-s	int-r-w	l	Gem	c	.....	.....	Mack Tractor AC
1,000	.....	Stmbg*	grav	d-p	own	selec	own	amid	3	chn	own	14.1	r-rd	.....	Mthr	ext-j-s	int-r-w	l	Gem	c	.....	.....	Mack Tractor AC
1,120	16	Zenith	vacm	d-d	.....	selec	.....	mtr	3	worm	.....	7.5	r-rd	r-rd	.....	ext-r-w	int-r-w	.....	.....	.....	.....	own	Manly 30
1,150	15	Zenith	vacm	.....	.....	selec	.....	mtr	3	worm	.....	8.25	r-rd	r-rd	.....	ext-r-w	int-r-w	.....	.....	.....	.....	own	Manly 40
1,035	14	Zenith	vacm	d-d	.....	selec	.....	mtr	4	worm	.....	8.66	r-rd	r-rd	.....	int-r-w	int-r-w	.....	.....	.....	.....	own	Manly 50
1,100	16	Master	grav	d-p	Fuller	selec	Fuller	mtr	3	in-g	Torbn	8	spgs	spgs	Dtrt	ext-r-w	int-r-w	l	Wol	c	metl	Arvac	Master M
1,100	16	Master	grav	d-d	Fuller	selec	Fuller	mtr	3	in-g	Torbn	8	spgs	spgs	Dtrt	ext-r-w	int-r-w	l	Wol	c	metl	Arvac	Master O
1,100	16	Master	grav	d-d	Fuller	selec	Fuller	mtr	3	worm	Timkn	8.33	spgs	spgs	Dtrt	ext-r-w	int-r-w	l	Wol	c	metl	Arvac	Master W
1,100	16	Master	grav	d-d	Fuller	selec	Fuller	mtr	3	worm	Timkn	8.33	spgs	spgs	Dtrt	ext-r-w	int-r-w	l	Wol	c	metl	Arvac	Master WL
1,000	12	Master	grav	d-p	B-Lipe	selec	B-Lipe	amid	4	worm	Timkn	10.33	spgs	spgs	Dtrt	int-r-w	int-r-w	l	Lavn	c	metl	Spicer	Master A
.....	.....	.....	.....	cone	.....	selec	.....	mtr	3	worm	.....	.....	spgs	spgs	.....	ext-r-w	int-r-w	.....	.....	.....	.....	.....	Maxfer .....
1,400	18	Jhnson	grav	cone	own	selec	own	mtr	3	worm	own	7.25	spgs	spgs	Shel	int-r-w	int-r-w	l	own	c	metl	own	Maxwell .....
.....	.....	Stmbg	grav	d-d	Fuller	selec	Fuller	mtr	3	worm	Timkn	7	spgs	spgs	Tut	int-r-w	int-r-w	l	Gem	c	fab	own	Menominee Hurryton
.....	.....	.....	grav	d-d	Fuller	selec	Fuller	mtr	3	worm	Timkn	9.25	r-rd	spgs	Tut	int-r-w	int-r-w	l	Gem	c	metl	Acme	Menominee H
.....	.....	.....	grav	d-d	Fuller	selec	Fuller	mtr	3	worm	Timkn	9.25	r-rd	spgs	Tut	int-r-w	int-r-w	l	Gem	c	metl	Spicer	Menominee D
.....	.....	Stmbg	grav	d-d	Fuller	selec	Fuller	amid	4	worm	Timkn	10.33	r-rd	spgs	Tut	int-r-w	int-r-w	l	Gem	c	metl*	own*	Menominee G
.....	.....	.....	grav	d-d	B-Lipe	selec	B-Lipe	amid	4	worm	Timkn	13.66	r-rd	spgs	Tut	int-r-w	int-r-w	l	Gem	c	metl	Blood	Menominee J
.....	.....	Zenith	.....	d-d	Fuller	selec	Fuller	mtr	3	worm	Timkn	.....	r-rd	spgs	.....	ext-r-w	ext-r-w	.....	Ross	.....	.....	.....	Modern 30
1,140	18	Miller	grav	d-d	own	selec	own	mtr	3	worm	Timkn	6	spgs	spgs	.....	int-r-w	int-r-w	l	Ross	c	fab	Therm	Moreland 17-N
1,140	16	Miller	grav	d-d	own	selec	own	amid	4	worm	Timkn	7	r-rd	spgs	.....	int-r-w	int-r-w	l	Ross	c	fab	Therm	Moreland 17-B
1,090	15½	Miller	grav	d-p	own	selec	own	amid	4	worm	Timkn	6.8	r-rd	spgs	own	int-r-w	int-r-w	l	Ross	c	fab	own	Moreland 17-C
950	13	Miller	grav	d-p	own	selec	own	amid	4	worm	Timkn	7.8	r-rd	spgs	own	int-r-w	int-r-w	l	Ross	c	fab	own	Moreland 17-G
950	10	Miller	grav	d-d	own	selec	own	amid	4	worm	Timkn	8.8	r-rd	spgs	own	int-r-w	int-r-w	l	Ross	c	fab	own	Moreland 17-J
1,190	16	Stewrt	vacm	d-d	Fuller	selec	Fuller	mtr	3	in-g	Torbn	8	spgs	spgs	Perf	ext-r-w	int-r-w	l	Lavn	c	metl	Hart	Muskegon 20
1,250	20	Carter	vacm	d-d	Mech	selec	Mech	mtr	3	worm	Emp	7	spgs	spgs	Cant	int-r-w	ext-r-w	l	C.A.S	c	metl	Univ	Myers 50
1,250	20	Carter	vacm	d-d	Mech	selec	Mech	mtr	3	worm	Emp	7	spgs	spgs	Cant	int-r-w	ext-r-w	l	C.A.S	c	metl	Univ	Myers 55
1,250	18	Carter	vacm	d-p	B-Beck	selec	G-Lees	mtr	3	worm	Emp	7.75	spgs	spgs	Cant	int-r-w	ext-r-w	l	C.A.S	c	metl	Univ	Myers 70
1,250	18	Carter	vacm	d-d	B-Beck	selec	G-Lees	mtr	3	worm	Emp	7.75	spgs	spgs	Cant	int-r-w	ext-r-w	l	C.A.S	c	metl	Univ	Myers 75
1,351	20	Stmbg	grav	d-p	B-Beck	selec	Dtrt	mtr	3	in-g	Clark	6.8	spgs	spgs	Std	ext-r-w	ext-d-s	l	Jacox	c	metl	own	Nash 2018
1,191	15	Stmbg	grav	d-p	B-Beck	ind-c	own	amid	4	in-g-4	own	8.5	spgs	spgs	Mthr	int-r-w	ext-d-s	l	Lavn	c	metl	Spicer	Nash 4017
1,281	16	Stmbg	grav	d-p	B-Beck	selec	Dtrt	mtr	3	in-g	Clark	9	spgs	spgs	Std	ext-r-w	ext-d-s	l	Jacox	c	metl	own	Nash 3018
1,200	16	Stmbg	grav	d-d	B-Lipe	selec	B-Lipe	mtr	3	worm	Timkn	6.75	spgs	spgs	Tut	int-r-w	int-r-w	r	Lavn	c	fab	own	Nelson & LeMoon F1
1,200	15	Stmbg	grav	d-d	B-Lipe	selec	B-Lipe	mtr	3	worm	Timkn	7.75	spgs	spgs	Tut	int-r-w	int-r-w	r	Lavn	c	fab	own	Nelson & LeMoon F2
1,100	12	Stmbg	grav	d-d	B-Lipe	selec	B-Lipe	mtr	4	worm	Timkn	.....	spgs	spgs	Tut	int-r-w	int-r-w	r	Lavn	c	fab	own	Nelson & LeMoon F3½
1,100	10	Stmbg	grav	d-d	B-Lipe	selec	B-Lipe	mtr	4	worm	Timkn	.....	spgs	spgs	Tut	int-r-w	int-r-w	r	Lavn	c	fab	own	Nelson & LeMoon F5
1,800	.....	Zenith	grav	d-d	B-Lipe	selec	B-Lipe	mtr	3	worm	Timkn	8.5	spgs	spgs	Perf	int-r-w	int-r-w	l	Ross	c	metl	Hart	Netco D
1,573	25	Stmbg	grav	d-d	Cover	selec	Cover	mtr	3	worm	Timkn	6.5	spgs	spgs	.....	int-r-w	int-r-w	.....	Gem	.....	.....	.....	Niles B
1,175	15	Stmbg	grav	d-p	B-Beck	selec	Cover	amid	3	worm	Timkn	8.5	r-rd	spgs	.....	int-r-w	int-r-w	.....	Gem	.....	.....	.....	Niles E
1,300	16	Stmbg	vacm	d-p	B-Beck	selec	Fuller	mtr	4	worm	Shel	8.75	spgs	spgs	Kal	int-r-w	int-r-w	l	Ross	c	metl	Blood	Noble NW2
1,148	12	Stmbg	vacm	d-p	B-Beck	selec	Fuller	amid	4	worm	Shel	10.25	r-rd	spgs	Kal	int-r-w	int-r-w	l	Ross	c	metl	Acme	Noble NW4
2,600	28	Carter	vacm	d-p	B-Beck	selec	G-Lees	mtr	3	worm	Emp	7.2	spgs	spgs	Perf	int-r-w	ext-r-w	l	C.A.S	c	metl	Univ	Norwalk .....
2,600	25	Carter	vacm	d-p	B-Beck	selec	G-Lees	mtr	3	worm	Emp	7.5	spgs	spgs	Perf	int-r-w	ext-r-w	l	C.A.S	c	metl	Univ	Norwalk .....
.200	15	Zenith	vacm	d-d	Muncie	selec	Muncie	mtr	3	worm	Chgo	.....	spgs	spgs	Tut	int-d-s	int-r-w	l	Ross	c	metl	Hart	O.K 3T
.200	12	Zenith	vacm	d-d	Fuller	selec	Fuller	mtr	4	worm	Hays	.....	spgs	spgs	Tut	int-r-w	int-r-w	l	Ross	c	metl	Hart	O.K. 1T
.800	20	Carter	grav	cone	Lyc	selec	G-Lees	mtr	3	bevl	Salsby	6	tor-t	tor-t	Tut	ext-r-w	int-r-w	l	C.A.S	c	fab	own*	Old Hickory M
.250	15	Rayfld	vacm	w-d	own	selec	B-Lipe	amid	4	worm	Shel	8.75	spgs	spgs	Shel	int-r-w	int-r-w	r	Ross	c	metl	Spicer	Old Reliable WA
.150	12	Stmbg	vacm	w-d	own*	selec	B-Lipe	amid	4	worm	Shel	8.75	spgs	spgs	Shel	int-r-w	int-r-w	r	Ross	c	metl	Spicer	Old Reliable WB
.250	15	Rayfld	grav	d-d	B-Lipe	selec	B-Lipe	mtr	3	worm	Shel	8.75	spgs	spgs	Shel	int-r-w	int-r-w	r	Ross	c	metl	Spicer	Old Reliable WC
.250	15	Rayfld	vacm	d-d	Fuller	selec	Fuller	amid	4	worm	Shel	8.75	spgs	spgs	Shel	int-r-w	int-r-w	r	Ross	c	metl	Spicer	Old Reliable WD
950	12	Stmbg	grav	w-d	own	selec	Savg	jst	3	chn*	Shel	8.93	r-rd	r-rd	Shel	ext-d-s	int-r-w	r	Ross	r	metl	Hart*	Old Reliable CO
1,000	12	Stmbg	grav	w-d	own*	selec	Savg	jst	4	chn*	Shel	10.88	r-rd	r-rd	Shel	ext-d-s	int-r-w	r	Ross	r	metl	Hart*	Old Reliable CP
1,300	16	Stmbg	grav	w-d	H-Shaw	id-c	Cotta	amid	3	worm	Timkn	8.75	r-rd	spgs	Mthr	int-r-w	int-r-w	l	Ross	c	metl	Spicer	Oneida A
1,300	15	Stmbg	grav	w-d	H-Shaw	id-c	Cotta	amid	3	worm	Tikmn	9.25	r-rd	spgs	Mthr	int-r-w	int-r-w	l	Ross	c	metl	Spicer	Oneida B
1,200	14	Stmbg	grav	w-d	H-Shaw	id-c	Cotta	amid	3	worm	Timkn	9.25	r-rd	spgs	Mthr	int-r-w	int-r-w	l	Ross	c	metl	Spicer	Oneida C
1,150	12	Stmbg	grav	w-d	H-Shaw	id-c	Cotta	amid	3	worm	Timkn	10.5	r-rd	spgs	Mthr	int-r-w	int-r-w	l	Ross	c	metl	Spicer	Oneida D
1,100	11	Stmbg	grav	w-d	H-Shaw	id-c	Cotta	amid	3	worm	Timkn	11.66	r-rd	spgs	Mthr	int-r-w	int-r-w	l	Ross	c	metl	Spicer	Oneida E
.....	.....	Tltsn	vacm	cone	own	selec	own	r-ax	3	bevl	own	4.3	t-t	t-t	.....	ext-r-w	int-r-w	.....	own	.....	.....	.....	Overland Panel
.....	.....	Tltsn	grav	cone	own	selec	own	r-ax	3	s-bev	own	4.4	t-t	t-t	.....	ext-r-w	int-r-w	.....	own	.....	.....	.....	Overland Express
1,000	16	own	pres	d-d	own	selec	own	amid	4	worm	own	6.25	tor-a	tor-a	S-P	ext-d-s	int-r-w	l	own	l&c	metl*	Spicer	Packard 1-E
1,000	16	own	pres	d-d	own	selec	own	amid	4	worm	own	6.25	tor-a	tor-a	S-P	ext-d-s	int-r-w	l	own	l&c	metl*	Spicer	Packard E

ABBREVIATIONS—Makers of Parts

*Other Options
A-K—Atwater-Kent
Al-Ch—Allis-Chalmers
Aut-L—Auto-Lite
B-Beck—Borg & Beck
B-Lipe—Brown-Lipe
Blng—Berling
Brem—Bremer
Can—Candler
Cant—Canton-Cleveland
CAS—C.A.S. Products Co.
Champ—Champion Spng.
Chcgo—Chicago-Stndrd
Chgo—Chicago Mfg. Co.
Con—Continental
Conn—Connecticut
Cover—Covert
Del—Delany
Ditw—Ditweiler
Oneto—Dyneto
Dtrt—Detroit Press. Stl.
Dtrt—Detroit Lubricat.
Dtrt—Detroit G. & M. Co.
Dtrt—Detroit Stl. Spng.
Duplx—Duplex
E&M—English & Mersick
Eismn—Eisemann
Emp—Empire
Ens—Ensign
Eur—Eureka
Fed—Fedders
Flech—Fletcher
Fost—Foster
Franck—Francke
G&D—Gray & Davis
G&O—G. & O. Mfg. Co.
GBS—Golden, Belknap & Swartz
G-Lees—Grant-Lees
Gem—Gemmer
H&N—H. & N. Carburetor Co.
Harr—Harrison
Hart—Hartford
Hays—Hayes
Her—Hercules
Hig—Higgins
Hol—Holley
H-Shaw—Hele-Shaw
H-S—Herschell-Spillman
Hyd—Hydraulic
Idl—Ideal
Ind—Industrial Equipment Co.
Iron—Iron City
J-A—Jackson Radiator Wks.
Jacox—Jackson-Church-Wilcox
Jas—Jamestown Car Pts. Co.
Jhnson—Johnson
Kal—Kalamazoo
K-B—Kinsler-Bennett
Key-H—Keystone-Hindley
King—Kingston
Koko—Kokomo
Lau—Lauraine
Lavn—Lavine
LeR—LeRoi
Lgt—Light Foundry
Ligt—Liggett
L-N—Leece Neville
Lyc—Lycoming
Marvl—Marvel
Mast—Master
McC—McCord
McFar—McFarland
Mech—Mechanics
Merl—Merrill
Mil—Milwaukee
Mnrch—Monarch
Mod—Modine
Mthr—Mather
M&E—Merchant & Evans
Natl—National
N.A.—North American
N-E—North East
Nlite—Nicolite
Penn—Penn Spring Co.
P&B—Parish & Bingham
Per—Perfex
Perf—Perfection
Prsh—Parish
R-T—Rome-Turney
Rayfld—Rayfield
Rem—Remy
Rowl—Wm. Harvel Rowland
Rugles—Ruggles
Russl—Russel
Rut—Rutenber
Savg—Savage Arms
Salsby—Salisbury
Schblr—Schebler
Shel—Sheldon
Shkspr—Shakespeare
Smth—A. O. Smith
S-P—Spring-Perch
Splif—Splitdorf
Stan—Standard Radiator Co.
Stand—Standard Steel Spring Co.
Stewrt—Stewart
Stlg—Sterling
Stmbg—Stromberg
Sundmn—Sunderman
S-W—Sparks-Withington
Therm—Thermoid
Timkn—Timken
Tltsn—Tillotson
Torbn—Torbenson
Tut—Tuthill
Univ—Universal Machine Co.
Wau—Waukesha
West—Westinghouse
Wis—Wisconsin
Wol—Wohlrab
W-W—Walker-Weiss

Detailed Technical Specifications of

Name and Model	Tons Capacity	Chassis Price	Wheelbase Inches	FRAME			TIRES			Wheels	ENGINE														
								Size in Ins.							COOLING			IGNITION			ELEC. SYSTEM			GOVERNOR		
				Make	Material	Type	Kind	Front	Rear		Make	No. Cyl. Bore and Stroke N.A.C.C. Hp.	Cylinders Cast	Water Circ.	Radiator Make	Radiator Core and Case	Type	Make	Spark Advance	Type	Make	Extra Cost $	Type	Make	Drive
Packard E	2	3,400	144	own	rol-c	flex	s*	34x4	34x4d	wd	own	4-4 x5½-25.6	4	cent	own	cel-sht	sing	Spltf	hand	sl&i-2	Bijur	180	cent	own	motor
Packard E	3	4,100	156	own	rol-c	flex	s*	36x5	36x5d	wd	own	4-4½x5½-32.4	4	cent	own	cel-sht	sing	Spltf	hand	sl&i-2	Bijur	180	cent	own	motor
Packard E	4	4,450	156	own	rol-c	flex	s*	35x5	40x5d	wd	own	4-4½x5½-32.4	4	cent	own	cel-sht	sing	Spltf	hand	sl&i-2	Bijur	180	cent	own	motor
Packard E	5	5,150	156	own	rol-c	flex	s*	36x6	40x6d	wd	own	4-5 x5½-40.0	4	cent	own	cel-sht	sing	Spltf	hand	sl&i-2	Bijur	180	cent	own	motor
Packard E	6	5,400	156	own	rol-c	flex	s*	36x6	40x7d	wd	own	4-5 x5½-40.0	4	cent	own	cel-sht	sing	Spltf	hand	sl&i-2	Bijur	180	cent	own	motor
Palmer 1	1	1,695	132	P&B	p-stl		s*	34x3½	34x4	wd	Con	4-3½x5 -22.5	4	cent	Fed	cel-cst	dual	Bosch	fix				cent	Pierce	motor
Palmer 2	2	2,595	144	P&B	p-stl		s	36x3½	36x4d*	wd	Con	4-4½x5½-27.2	4	cent	Fed	cel-cst	dual	Bosch	fix				cent	Pierce	motor
Panhard A	1	1,195	130				p&s	32x3½	32x3½		Gray	4-3½x5 -19.6	4	ther			sing	Aut-L	hand	ltg	Aut-L				
Panhard B	1½	1,395	130				s	32x3½	32x4		Gray	4-3½x5 -19.6	4	ther			sing	Aut-L	hand	ltg	Aut-L				
Parker 2	2	3,150	150	own	p-stl	s-flex	s*	34x4	36x3½d	wd	Con	6-3½x5½-29.4	4	cent	own	sq-t-cst	sing	Bosch	hand	s&l-2	West	none	cent	Pierce	motor
Parker 3	3	3,700	160	own	p-stl	s-flex	s	34x4	36x5d	wd	Con	6-3½x5½-29.4	4	cent	own	sq-t-cst	sing	Bosch	hand	s&l-2	West	none	cent	Pierce	motor
Parker 4	4	4,250	160	own	p-stl	s-flex	s	36x5	40x5d	wd	Con	6-3½x5½-33.7	2	cent	own	sq-t-cst	sing	Bosch	hand	s&l-2	West	none	cent	Pierce	motor
Parker 5	5	5,000	168	own	p-stl		s	36x5	40x6d	wd	Con	6-3½x5½-33.7	2	cent	own	sq-t-cst	sing	Bosch	hand	s&l-2	West	none	cent	Pierce	motor
Peerless TC	3	4,125	151	own	rol-c	s-flex	s	36x4	40x4d	wd	own	4-4½x6½-32.4	2	gear	own	fin-c-a	dual	Remy	hand	none	none	none	cent	own	motor
Peerless TC	4	4,150	151	own	rol-c	s-flex	s	36x5	40x5d	wd	own	4-4½x6½-32.4	2	gear	own	fin-c-a	dual	Remy	hand	none	none	none	l-b	own	motor
Peerless TC	5	4,700	151	own	rol-c	s-flex	s	36x6	40x6d	wd	own	4-4½x6½-32.4	2	gear	own	fin-c-a	dual	Remy	hand	none	none	none	l-b	own	motor
Pierce-Arrow X-4	2	3,750	150	Prsh	p-stl	flex	s*	36x4	36x4d	wd	own	4-4 x5½-25.6	2	cent	own	fin-c-a	dual	Eismn	hand	sl&i-2	West		cent	own	motor
Pierce-Arrow R-9	5	5,500	168	Prsh	p-stl	flex	s*	36x6	40x6d	wd	own	4-4½x6 -38.2	2	cent	own	fin-c-a	dual	Eismn	hand	sl&i-2	West		cent	own	motor
Power	2		150	own	rol-c	s-flex	pnu	36x4	36x4d	wd	Con	4-4½x5½-27.2	4	cent	Can	sq-t-cst	sing	Simms	hand				cent	Pierce	motor
Rainier R-5	½	1,250	115	P&B	p-stl	s-flex	pnu	33x4	33x4	wd	Lgt	4-3½x4½-16.9	4	ther	Har	cel-pst	sing	Simms	fix		Bijur	125	none	none	none
Rainier R-2	¾	1,350	125	P&B	p-stl	s-flex	pnu	34x4	34x4	wd	Lgt	4-3½x4½-16.9	4	ther	Har	cel-pst	sing	Simms	fix		Bijur	125	none	Mnrch	motor
Rainier R-4	1¼	1,595	125	P&B	p-stl	s-flex	p&s	34x3	34x4	wd	Lgt	4-3½x4½-16.9	4	ther	Har	cel-pst	sing	Simms	fix		Bijur	125	suct	Mnrch	motor
Rainier R-6	1½	1,890	133	Prsh	p-stl	s-flex	s&c	32x4	34x4	wd	Con	4-3½x5½-19.6	4	ther	Har	cel-pst	sing	Sims*	fix	none	none	none	suct	Mnrch	motor
Rennoc-Leslie M	2½	2,895	144	own	rol-c	s-flex	s	36x5	36x7	wd	Buda	4-4½x5½-27.2	4	cent	Chgo	fin-cst	dual	Spltf	hand	ltg	West	none	cent	Pierce	motor
Rennoc-Leslie Tractor B	8	2,895	116	own	rol-c	s-flex	s	36x5	36x7	wd	Buda	4-4½x5½-27.2	4	cent	Chgo	fin-cst	dual	Spltf	hand	ltg	West	none	cent	Pierce	motor
Reo F	¾	1,250	128	own	p-stl	rigid	pnu	34x4½	34x4½	wd	own	4-4½x4½-27.2	2	cent	own	fin-pst	sing	Remy	hand	sl&i-2	Remy	none	none	none	none
Republic Despatch	¾	1,095	110		p-stl	s-flex	opt	32x3	32x3½	wd	own	4-3½x5 -16.9	4	ther	own	cel-cst	sing	Remy	hand	ltg	Remy		suc	Rugles	motor
Republic 9 Special	¾	1,295	128		p-stl	s-flex	opt	32x3	32x4	wd	own	4-3½x5 -19.6	4	ther	own	cel-cst	sing	Eismn	fix	none	none	none	suc	Rugles	motor
Republic 10	1	1,485	124		p-stl	s-flex	s	34x3	34x4	wd	Con	4-3½x5 -19.6	4	ther	own	cel-cst	sing	Eismn	fix	none	none	none	suc	Rugles	motor
Republic 11X	1½	1,775	144		p-stl	s-flex	s	34x3½	34x5	wd	Con	4-3½x5 -22.5	4	ther	own	cel-cst	sing	Eismn	fix	none	none	none	suc	Rugles	motor
Republic 12X-12A	2	2,150	144		p-stl	s-flex	s	34x4	34x6	wd	Buda	4-4½x5½-27.2	4	cent	own	cel-cst	sing	Bosch	fix	none	none	none	suc	Rugles	motor
Republic TX	3½	3,450	165		p-stl	s-flex	s	36x5	36x5d	c-s	Buda	4-4½x5½-29.0	4	cent	own	cel-cst	sing	Bosch	hand	none	none	none	suc	Rugles	motor
Riker B	3		150	Prsh	p-stl	s-flex	s	36x5	36x5d	wd	own	4-4½x6 -29.0	2	cent	own	fin-c-a	dual	Blng*	hand	s&l-2	West		l-b	own	motor
Riker BB	4		150	Prsh	p-stl	s-flex	s	36x5	36x6d	wd	own	4-4½x6 -29.0	2	cent	own	fin-c-a	dual	Blng*	hand	s&l-2	West		l-b	own	motor
Rowe CDW	2	3,000		own	rol-c	rigid	s	34x4	36x7	wd	Wis	4-4 x5 -25.6	4	cent	Fed	sht		Bosch		none	none	none	cent	Duplex	motor
Rowe CDW	2½	3,250		own	rol-c	rigid	s	34x4	36x4d	wd	Wis	4-4 x5 -25.6	4	cent	Fed	sht		Bosch		none	none	none	cent	Duplex	motor
Rowe DEW	3	3,800		own	rol-c	rigid	s	36x5	36x5d	wd		4-4 x6 -25.6	4	cent	Fed	sht		Bosch		none	none	none	cent	Duplex	motor
Rowe FW	5	4,900		own	rol-c	rigid	s	36x6	40x6d	wd	Wis	4-4½x5½-36.1	2	cent	Fed	sht		Bosch					cent	Duplex	motor
Royal 1	1	2,400	128	own	rol-c	rigid	s	34x4	34x5	wd	Wis	4-3½x5 -16.9	4	cent	Kells	fin-cst	sing	Bosch	fix	sl&i	opt		suc	Mnrch	motor
Royal 1½	1½	2,800	128½	own	rol-c	rigid	s	34x4	34x5	wd	Wis	4-3½x5 -22.5	4	cent	Kells	fin-cst	sing	Bosch	fix	sl&i	opt		suc	Mnrch	motor
Royal 2	2	3,200	132	own	rol-c	rigid	s	36x4½	36x6	wd	Wis	4-4 x6 -25.6	4	cent	Kells	fin-cst	sing	Bosch	fix	sl&i	opt		suc	Mnrch	motor
Royal 2½	2½	3,500	132½	own	rol-c	rigid	s	36x4½	36x6	wd	Wis	4-4½x6 -29.0	4	cent	Kells	fin-cst	sing	Bosch	fix	sl&i	opt		suc	Mnrch	motor
Royal 3½	3½	4,200	158	own	rol-c	rigid	s	36x5	38x5d	wd	Wis	4-4½x6 -32.4	4	cent	Kells	fin-cst	sing	Bosch	fix	sl&i	opt		suc	Mnrch	motor
Royal 5	5	5,000	168	own	rol-c	rigid	s	36x6	40x6d	wd	Wis	4-4½x5½-36.1	2	cent	Kells	fin-cst	sing	Bosch	fix	s&l	opt		suc	Mnrch	motor
Royal 6	6	5,400	168	own	rol-c	rigid	s	36x6	40x6d	wd	Wis	4-5½x6 -42.2	2	cent	Kells	fin-cst	sing	Bosch	fix	sl&i	opt		suc	Mnrch	motor
Royal 7	7	6,500	168	own	rol-c	rigid	s	36x7	40x7d	wd	Wis	4-5½x7 -44.2	2	cent	Kells	fin-cst	sing	Bosch	fix	s&l	opt		suc	Mnrch	motor
Rush D	½	895	105				pnu	31x4	31x4		Lyc	4-3½x5 -16.9	4	ther			sing	Conn	hand	s&l	Spltf				
Sandow G	1		120	Savg	p-stl	flex	s	34x3½	34x5	wd	Con	4-3½x5 -19.6	4	ther	Brm	fin-cst	sing	Eismn							
Sandow CG	1½		134	Savg	p-stl	s-flex	s	34x3½	34x5	wd	Con	4-3½x5 -19.6	4	ther	Brm	fin-cst	sing	Eismn	hand						
Sandow H	1½		138	Savg	p-stl	s-flex	s	34x4	34x6	wd	Con	4-3½x5 -19.6	4	ther	Brm	fin-cst	sing	Eismn	hand						
Sandow J	2		165	Savg	p-stl	s-flex	s	36x4	36x7	wd	Con	4-4½x5½-27.2	4	cent	Chgo	fin-cst	sing	Bosch	hand				suc		motor
Sandow	3½		175			s-flex	s	36x5	36x5d	wd	Con	4-4½x5½-32.4	2	cent	Chgo	fin-cst	sing	Bosch	hand				suc		motor
Sandow	5		163	Savg	p-stl	s-flex	s	36x6	40x6d	wd	Wau	4-4½x6½-36.1	4	cent	Chgo	fin-cst	sing	Bosch	hand				suc	Mnrch	motor
Sanford 25	2½	3,000	156	Prsh	p-stl	rigid	s	36x4	36x4d	wd	Con	4-4½x5½-27.2	4	cent	McC	fin-cst	sing	Bosch	hand	none	none	none	cent	Pierce	motor
Sanford 35	3½	3,975	174	Prsh	p-stl	rigid	s	36x5	36x5d	wd	Con	4-4½x5½-32.4	2	cent	McC	fin-cst	sing	Bosch	hand	none	none	none	cent	Pierce	motor
Sanford 50	5	4,750	174	Prsh	p-stl	rigid	s	36x5	36x6d	wd	Con	4-4½x5½-32.4	2	cent	McC	fin-cst	sing	Bosch	hand	none	none	none	cent	Pierce	motor
Schacht	2	3,150	144	own	rol-c	flex	s	36x4	36x7	wd	Buda	4-4½x5½-29.0	4	cent	own	p-t-cst	sing	Bosch	hand	none	none	none	cent	Duplex	motor
Schacht	2½	3,500	156	own	rol-c	flex	s	36x4	36x4d	wd	Buda	4-4½x5½-29.0	4	cent	own	p-t-cst	sing	Bosch	hand	none	none	none	cent	Duplex	motor
Schacht	3½	3,950	168	own	rol-c	flex	s	36x5	36x5d	wd	Buda	4-4½x5½-29.0	4	cent	own	p-t-cst	sing	Bosch	hand	none	none	none	cent	Duplex	motor
Schacht	5	4,950	168	own	rol-c	flex	s	36x5	40x6d	wd	Buda	4-4½x5½-29.0	2	cent	own	p-t-cst	sing	Bosch	hand	none	none	none	cent	Duplex	motor
Schleicher	3	3,675	150*				s	34x4½	34x3½d		Con	4-4½x5½-29.0	2					Bosch	hand					opt	
Schleicner	5	4,725	150*				s	34 .5	34x4d		Con	4-5 x6 -40-0	2					Bosch	hand						
Selden TXR	1		137½	P&B	p-stl	s-flex	s	34x3½	34x5	wd	Con	4-3½x5 -19.6	4	ther	Bush	fin-sht	sing	Bosch	fix	s&l	N-E		cent	Pierce	motor
Selden TWL	1		140½	P&B	p-stl	s-flex	s	34x3	34x4	wd	Con	4-3½x5 -19.6	4	ther	Bush	fin-sht	sing	Bosch	fix	s&l	N-E		cent	Pierce	motor
Selden TXL	1		140	P&B	p-stl	s-flex	s	34x3½	34x5	wd	Con	4-3½x5 -19.6	4	ther	Bush	fin-sht	sing	Bosch	fix	s&l	N-E		cent	Pierce	motor
Selden JCB&JCBL	2		150	P&B	p-stl	s-flex	s	36x4	36x7	wd	Con	4-4¼x5½-27.2	4	cent	Bush	fin-cst	sing	Bosch	fix	s&l	N-E		cent	Pierce	motor

ABBREVIATIONS—Types of Construction

*Other Options
amid—amidships
auto—automatic
bevl—bevel
c—center
c&l—center and left
c&s—cushion and solid
cent—centrifugal
c-s—cast steel
c-a—cast aluminum
cel-cst—cellular core, cast case
cel-pst—cellular core, pressed steel case
cel-sht—cellular core, sheet case
chn—chain
cylinders cast, 2 in pairs
cylinders cast, 4 in block
cylinders cast, 3 in threes
cylinders cast, 1 singly
d-d—dry disk
d-p—dry plate
d-rd—double reduction
d-s—driveshaft
elec—electric
ext-d-s—external driveshaft
ext-f-w—external front wheels
ext-g—external gear
ext-jst—external jackshaft
ext-r-w—external rear wheel
fab—fabric
fin—finned tube
fin-c-a—finned tube core, cast aluminum case
fin-cst—finned tube core, cast case
fin-pst—finned tube core, pressed steel case
fin-sht—finned tube core, sheet case
fix—fixed
flex—flexible
fric—friction
g.p.—gear pump
grav—gravity
gset—gearset
hyd—hydraulic
ind-c—individual clutch
int-d-s—internal drive-shaft
int-f-w—internal front wheels
in-g—internal gear
in-g-4—internal gear drive on 4 wheels
int-r-w—internal rear wheel
jst—unit with jackshaft
l—left
l&c—left and center
leat—leather
l-b—loose ball
ltg—lighting
metl—metal
mtr—unit with motor
opt—optional
p—plate in oil
pist—piston pump
plan—planetary
pnu—pneumatic
pres—pressure
prog—progressive sliding gearset
p-t-c-a—plain tube core, cast aluminum case
p-t-cst—plain tube core, cast case
p-stl—pressed steel
p&s—pneumatic and solid
r—right
r-ax—unit with rear axle
rng-cst—ring core, cast case
rol-c—rolled channel
rol-i—rolled I-beam
r-rd—radius rods
selec—selective sliding gear
s-flex—semi-flexible
stg—starting
s&l—starting and lighting
s,l&i—starting, lighting and ignition
s l&i2—starting, lighting and ignition, two-unit
sing—single
s—solid
s&c—solid and cushion
spgs—springs
sq-t-cst—square tube core, cast iron
sq-t-sht—square tube core, sheet case
stk—stock
sub-f—sub-frame
suc—suction
s-bev—spiral bevel
ther—thermeo-syphon
tor-a—torque arm
t-t—torsion tube
unt-x—unit with axle
vacm—vacuum
wd—wood
w-d—multiple disk in oil
worm—top worm
w-p—wet plate
zz-t-cst—zig zag tube core, cast case
zz-t-pst—zig zag tube core, pressed steel case
zz-t-sht—zig-zag tube core, sheet case

Gasoline Motor Trucks for 1919—Continued

ENGINE						TRANSMISSION									BRAKES		CONTROL			UNIVERSALS		
SPEED		FUEL SYS.		CLUTCH		GEARSET				FINAL DRIVE							STEERING GEAR					
Motor in R.p.m.	Truck in M.p.h.	Carbureter Make	Fuel Feed	Type	Make	Type	Make	Placed	Speeds	Type	Axle Make	Total Gear Reduction	Propulsion Taken By	Torque Taken By	Springs Make	Foot	Hand	Placed	Make	Levers	Type	Make	Name and Model
1,000	14	own....	pres...	d-d...	own...	selec...	own...	amid..	4	worm.	own....	7.25	tor-a...	tor-a...	S-P....	ext-d-s.	int-r-w.	l....	own..	l&c..	metl*..	Spicer..	Packard.....E
1,000	12	own....	pres...	d-d...	own...	selec...	own...	amid..	4	worm.	own....	9	tor-a...	tor-a...	S-P....	ext-d-s.	int-r-w.	l....	own..	l&c..	metl*..	Spicer..	Packard.....E
1,000	12	own....	pres...	d-d...	own...	selec...	own...	amid..	4	worm.	own....	10	tor-a...	tor-a...	S-P....	ext-d-s.	int-r-w.	l....	own..	l&c..	metl*..	Spicer..	Packard.....E
1,000	11	own....	pres...	d-d...	own...	selec...	own...	amid.	4	worm.	own....	10.66	tor-a...	tor-a...	S-P....	ext-d-s.	int-r-w.	l....	own..	l&c..	metl*..	Spicer..	Packard.....E
1,000	11	own....	pres...	d-d...	own...	selec...	own...	amid..	4	worm.	own....	10.66	tor-a...	tor-a...	S-P....	ext-d-s.	int-r-w.	l....	own..	l&c..	metl*..	Spicer..	Packard.....E
.....	...	Stmbg..	grav..	m-d...	Fuller..	prog...	Fuller..	.....	....	in-g...	Torbn..	.....	r-rd....	t-t....	Champ.	int-r-w.	.....	.....	Ross..	.....	metl....	Blood..	Palmer.....
1,000	15	Stmbg..	grav..	m-d...	Fuller..	prog...	Fuller..	.....	....	worm.	Timkn..	.....	r-rd....	t-t....	Champ.	int-r-w.	.....	.....	Ross..	.....	metl....	Blood..	Palmer.....
1,600	28	Schblr..	vacm..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	in-g...	Torbn..	6.5	t-t....	spgs...	Kal....	ext-r-w.	int-r-w.	.....	Lavn..	.....	.....	.....	Arvac.. Panhard.....A
1,600	22	Schblr..	vacm..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	in-g...	Torbn..	8	t-t....	spgs...	Kal....	ext-r-w.	int-r-w.	.....	Lavn..	.....	.....	.....	Arvac.. Panhard.....B
1,100	16	Stmbg..	grav..	d-d...	B-Lipe.	selec...	own...	mtr...	3	worm.	own....	9.66	r-rd....	.....	Tut....	int-d-s.	int-r-w.	l....	Ross..	l&c..	metl....	Spicer*.	Parker.....
1,100	14	Stmbg..	grav..	d-d...	B-Lipe.	selec...	own...	mtr...	3	worm.	own....	10.66	r-rd....	.....	Tut....	int-d-s.	int-r-w.	l....	Ross..	l&c..	metl....	Spicer*.	Parker.....
1,100	13	Stmbg..	grav..	d-d...	B-Lipe.	selec...	own...	mtr...	3	worm.	own....	11.33	r-rd....	.....	Tut....	int-d-s.	int-r-w.	l....	Ross..	l&c..	metl....	Spicer*.	Parker.....
1,100	12	Stmbg..	grav..	d-d...	B-Lipe.	selec...	own...	mtr...	3	worm.	own....	12.66	r-rd....	.....	Tut....	int-d-s.	int-r-w.	l....	Ross..	l&c..	metl....	Spicer*.	Parker.....
925	12.5	Stmbg..	grav..	cone..	own...	selec...	own...	amid..	4	chn...	own....	8.7	r-rd....	spgs...	own...	ext-j-s.	int-r-w.	r....	own...	r....	metl....	own...	Peerless.....TC
925	12.5	Stmbg..	grav..	cone..	own...	selec...	own...	amid..	4	chn...	own....	8.7	r-rd....	spgs...	own...	ext-j-s.	int-r-w.	r....	own...	r....	metl....	own...	Peerless.....TC
925	12.5	Stmbg..	grav..	cone..	own...	selec...	own...	amid..	4	chn...	own....	10.4	r-rd....	spgs...	own...	ext-j-s.	int-r-w.	r....	own...	r....	metl....	own...	Peerless.....TC
925	11	Stmbg..	grav..	cone..	own...	selec...	own...	amid..	4	worm.	own....	8.25	r-rd....	tor-a...	S-P....	ext-d-s.	int-r-w.	r....	own...	r....	metl....	own...	Pierce-Arrow.....X-4
1,300	16	own....	grav..	cone..	own...	selec...	own...	amid..	3	worm.	own....	7.8	r-rd....	tor-a...	S-P....	ext-d-s.	int-r-w.	r....	own...	r....	metl....	own...	Pierce-Arrow.....R-9
950	14	own....	grav..	cone..	own...	selec...	own...	amid..	3	worm.	own....	.....	r-rd....	tor-a...	S-P....	ext-d-s.	int-r-w.	r....	own...	r....	metl....	own...	Pierce-Arrow.....
1,200	15	King...	grav..	d-d...	Fuller..	selec...	Fuller..	mtr...	4	worm.	Timkn..	.....	spgs...	spgs...	Dtrt....	int-r-w.	int-r-w.	l....	Ross..	r&c..	metl....	Univ...	Power.....
2,000	36	Zenith..	grav*.	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm.	Timkn..	5.8	spgs...	spgs...	Perf....	int-r-w.	int-r-w.	l....	Lavn..	c....	metl....	Hart..	Rainier.....R-5
2,000	23	Zenith..	grav*.	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm.	Timkn..	7.25	spgs...	spgs...	Perf....	int-r-w.	int-r-w.	l....	Lavn..	c....	metl....	Hart..	Rainier.....R-2
2,000	20	Zenith..	grav*.	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm.	Hays*..	8.5	spgs...	spgs...	Perf....	ext-r-w.	int-r-w.	l....	Lavn..	c....	metl....	Hart..	Rainier.....R-4
1,800	17	Zenith..	grav*.	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm.	Chgo ..	8.5	spgs...	spgs...	Perf....	ext-r-w.	int-r-w.	l....	Lavn..	c....	metl....	Hart..	Rainier.....R-6
1,200	15	Stmbg..	grav..	d-d...	Warner	selec...	Warner	amid..	4	worm.	Hays...	8.75	spgs...	spgs...	Rowl..	int-r-w.	int-r-w.	l....	Lavn..	c....	metl....	Hart..	Rennoc-Leslie.....M
1,000	12	Stmbg..	grav..	d-d...	Warner	selec...	Warner	amid..	4	worm.	Hays...	8.75	spgs...	spgs...	Rowl..	int-r-w.	int-r-w.	l....	Lavn..	c....	metl....	Hart..	Renhoc-Leslie Tractor.B
.....	...	Jhnson.	grav..	d-d...	own...	selec...	own...	amid..	3	s-bev..	own....	4.3	spgs...	tor-a...	Penn..	int-r-w.	.....	l....	own..	l&c..	metl*..	own...	Reo.....F
1,400	25	Stmbg..	grav..	d-d...	own...	selec...	own...	mtr...	3	in-g...	Torbn..	5.38	spgs...	spgs...	.....	ext-r-w.	ext-d-s.	l....	Jacox	c....	metl....	Univ...	Republic.....Despatch
1,400	25	Stmbg..	grav..	d-d...	own...	selec...	own...	mtr...	3	in-g...	Torbn..	6.65	spgs...	spgs...	.....	ext-r-w.	ext-d-s.	l....	Jacox	c....	metl....	Univ...	Republic.....9 Special
1,200	18	Stmbg..	grav..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	in-g...	Torbn..	7.15	spgs...	spgs...	.....	ext-r-w.	ext-r-w.	l....	Jacox	c....	metl....	Arvac..	Republic.....10
1,200	15	Stmbg..	grav..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	in-g...	Torbn..	8	spgs...	spgs...	.....	ext-r-w.	int-r-w.	l....	Jacox	c....	metl....	Arvac..	Republic.....11X
1,000	12	Stmbg..	grav..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	in-g...	Torbn..	8	spgs...	spgs...	.....	ext-r-w.	int-r-w.	l....	Jacox	c....	metl....	Arvac..	Republic.....12X-12A
1,000	10	Stmbg..	grav..	d-d...	Fuller..	selec...	Fuller..	mtr...	4	in-g...	Torbn..	10.26	spgs...	spgs...	.....	ext-r-w.	int-r-w.	l....	Jacox	c....	metl....	K-B..	Republic.....1X
1,350	14	own....	grav..	cone..	own...	selec...	own...	amid.	4	worm.	own....	10	r-rd....	tor-a...	S-P*..	ext-d-s.	int-r-w.	r....	Ross.	r....	metl....	own...	Riker.....B
1,350	14	own....	grav..	cone..	own...	selec...	own...	amid.	4	worm.	own....	10	r-rd....	tor-a...	S-P*..	ext-d-s.	int-r-w.	r....	Ross.	r....	metl....	own...	Riker.....BB
.....	...	Zenith..	grav..	w-d...	B-Lipe.	selec...	B-Lipe.	mtr...	4	worm.	Timkn..	.....	r-rd....	spgs...	Shel...	r-w....	r-w....	l....	Ross.	c....	metl....	Arvac..	Rowe.....CDW
.....	...	Zenith..	grav..	w-d...	B-Lipe.	selec...	B-Lipe.	mtr...	4	worm.	Shel...	.....	r-rd....	spgs...	Shel...	r-w....	r-w....	l....	Ross.	c....	metl....	Arvac..	Rowe.....CDW
.....	...	Zenith..	grav..	w-d...	B-Lipe.	selec...	B-Lipe.	mtr...	4	worm.	Shel...	.....	r-rd....	spgs...	Shel...	r-w....	r-w....	l....	Ross.	c....	metl....	M&E..	Rowe.....DEW
.....	...	Zenith..	grav..	w-d...	B-Lipe.	selec...	B-Lipe.	amid.	4	worm.	Shel...	.....	r-rd....	spgs...	Shel...	r-w....	r-w....	l....	Ross.	c....	metl....	M&E..	Rowe.....FW
1,600	18	Stmbg..	grav..	d-p...	B-Beck.	ind-c...	own...	amid.	3	worm.	Timkn*	.....	spgs...	spgs...	Merl...	int-r-w.	int-r-w.	r....	Ross.	r....	metl....	own...	Royal.....
1,600	18	Stmbg..	grav..	d-p...	B-Beck.	ind-c...	own...	amid.	3	worm.	Timkn*	.....	spgs...	spgs...	Merl...	int-r-w.	int-r-w.	r....	Ross.	r....	metl....	own...	Royal.....
1,600	18	Stmbg..	grav..	d-p...	B-Beck.	ind-c...	own...	amid.	3	worm.	Timkn*	.....	r-rd....	spgs...	Merl...	int-r-w.	int-r-w.	r....	Ross.	r....	metl....	own...	Royal.....
1,600	18	Stmbg..	grav..	d-p...	B-Beck.	ind-c...	own...	amid.	3	worm.	Timkn*	.....	r-rd....	spgs...	Merl...	int-r-w.	int-r-w.	r....	Ross.	r....	metl....	own...	Royal.....
1,600	18	Stmbg..	grav..	d-p...	B-Beck.	ind-c...	own...	amid.	3	worm.	Timkn*	.....	r-rd....	spgs...	Merl...	int-r-w.	int-r-w.	r....	Ross.	r....	metl....	own...	Royal.....
1,000	15	Stmbg..	grav..	w-d...	H-Shaw	ind-c...	own...	amid.	3	worm.	Timkn*	.....	r-rd....	spgs...	Merl...	int-r-w.	int-r-w.	r....	Ross.	r....	metl....	own...	Royal.....
1,000	15	Stmbg..	grav..	w-d...	H-Shw*	ind-c...	own...	amid.	3	worm.	Timkn*	.....	r-rd....	spgs...	Merl...	int-r-w.	int-r-w.	r....	Ross.	r....	metl....	own...	Royal.....
900	12	Stmbg..	grav..	w-d...	H-Shaw	ind-c...	own...	amid.	3	worm.	Timkn*	.....	r-rd....	spgs...	Merl...	int-r-w.	int-r-w.	r....	Ross.	r....	metl....	own...	Royal.....
1,600	29	Carter..	grav..	d-p...	B-Beck.	selec...	.....	mtr...	3	bevl...	own....	.5	spgs...	tor-a...	.....	ext-r-w.	int-r-w.	.....	Lavn.	.....	.....	.....	Rush.....D
1,050	20	Stmbg..	vacm..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	worm.	Shel...	6.5	spgs...	spgs...	Dtrt....	int-r-w.	int-r-w.	l....	Ross.	c....	metl....	K-B..	Sandow.....G
1,050	18	Stmbg..	vacm..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	worm.	Shel...	7.8	spgs...	spgs...	Dtrt....	int-r-w.	int-r-w.	l....	Ross.	c....	metl....	K-B*.	Sandow.....CG
1,100	15	Stmbg..	vacm..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	worm.	Shel...	8.75	spgs...	spgs...	Dtrt....	int-r-w.	int-r-w.	l....	Ross.	c....	metl....	Univ*.	Sandow.....H
1,000	15	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm.	Timkn.	8.5	spgs...	spgs...	Dtrt....	int-r-w.	int-r-w.	r....	Ross.	c....	metl....	Univ*.	Sandow.....J
1,000	.....	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm.	Timkn.	8.66	r-rd....	spgs...	Dtrt....	int-r-w.	int-r-w.	r....	Ross.	c....	metl....	Univ...	Sandow.....
950	10	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	amid.	4	worm.	Timkn.	10.5	r-rd....	spgs...	Dtrt....	int-r-w.	int-r-w.	r....	Ross.	c....	metl....	K-B*.	Sandow.....
1,250	15	Stmbg..	grav..	d-p...	B-Beck.	selec...	Dtrt...	amid.	4	worm.	Shel...	8.75	spgs...	spgs...	Perf....	int-r-w.	int-r-w.	l....	Ross.	c....	metl....	Spicer*.	Sanford.....25
1,100	13	Stmbg..	grav..	d-p...	B-Beck.	selec...	Warner	amid.	4	worm.	Shel...	.....	spgs...	spgs...	Perf....	int-r-w.	int-r-w.	l....	Ross.	c....	metl....	Spicer*.	Sanford.....35
1,100	13	Stmbg..	grav..	d-p...	B-Beck.	selec...	Warner	amid.	4	worm.	Shel...	.....	spgs...	spgs...	Perf....	int-r-w.	int-r-w.	l....	Ross.	c....	metl....	Spicer*.	Sanford.....50
900	16	Schblr..	grav..	cone..	Hart...	selec...	own...	amid.	3	worm.	own....	8.66	r-rd....	tor-a...	Natl...	ext-d-s.	int-r-w.	l....	own...	c....	metl....	Hart...	Schacht.....
900	14	Schblr..	grav..	cone..	Hart...	selec...	own...	amid.	3	worm.	own....	9.66	r-rd....	tor-a...	Natl...	ext-d-s.	int-r-w.	l....	own...	c....	metl....	Hart...	Schacht.....
900	12	Schblr..	grav..	cone..	Hart...	selec...	own...	amid.	3	worm.	own....	10.3	r-rd....	tor-a...	Natl...	ext-d-s.	int-r-w.	l....	own...	c....	metl....	Hart...	Schacht.....
900	10	Schblr..	grav..	cone..	Hart...	selec...	own...	amid.	3	worm.	own....	14	r-rd....	tor-a...	Natl...	ext-d-s.	int-r-w.	l....	own...	c....	metl....	Hart...	Schacht.....
1,200	25	Stmbg..	grav..	.....	.....	.....	own...	.....	....	chn...	own....	.....	r-rd....	.....	.....	ext-r-w.	ext-sht.	.....	.....	.....	.....	.....	Schleicher.....
1,200	20	Stmbg..	grav..	cone..	.....	selec...	own...	amid.	4	chn...	own....	.....	r-rd....	.....	.....	ext-r-w.	ext-sht.	.....	.....	.....	.....	.....	Schleicher.....
1,200	17	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	in-g...	Russl..	7.4	spgs...	spgs...	Perf....	ext-r-w.	int-r-w.	r....	Lavn.	c....	metl....	Spicer..	Selden.....TXR
1,135	17	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm.	Timkn.	6.75	spgs...	spgs...	Perf....	int-r-w.	int-r-w.	r....	Lavn.	c....	metl....	Spicer..	Selden.....TWL
1,200	17	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	in-g...	Russl..	7.4	spgs...	spgs...	Perf....	ext-r-w.	int-r-w.	r....	Lavn.	c....	metl....	Spicer..	Selden.....TXL
1,295	20	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	4	in-g...	Russl..	9.45	spgs...	spgs...	Perf....	ext-r-w.	int-r-w.	r....	Jacox	c....	metl....	Spicer..	Selden.....JCB&JCBL

ABBREVIATIONS—Makers of Parts

*Other Options
A-K—Atwater-Kent
Al-Ch—Allis-Chalmers
Aut-L—Auto-Lite
B-Beck—Borg & Beck
B-Lipe—Brown-Lipe
Blng—Berling
Brem—Bremer
Can—Candler
Cant—Canton-Cleveland
CAS—C.A.S. Products Co.
Champ—Champion Spng.
Chcgo—Chicago-Stndrd
Chgo—Chicago Mfg. Co.
Con—Continental
Conn—Connecticut
Cover—Covert
Del—Delany
Ditw—Ditweiler
Dneto—Dyneto
Dtrt—Detroit Press. Stl.
Dtrt—Detroit Lubricat.
Dtrt—Detroit G. & M. Co.
Dtrt—Detroit Stl. Spng.
Duplx—Duplex
E&M—English & Mersick
Eisnn—Eisemann
Emp—Empire
Ens—Ensign
Eur—Eureka
Fed—Fedders
Flech—Fletcher
Fost—Foster
Franck—Francke
G&D—Gray & Davis
G&O—G. & O. Mfg. Co.
GBS—Golden, Belknap & Swartz
G-Lees—Grant-Lees
Gem—Gemmer
H&N—H. & N. Carburetor Co.
Har—Harrison
Hart—Hartford
Hays—Hayes
Her—Hercules
Hig—Higgins
Hol—Holley
H-Shaw—Hele-Shaw
H-S—Herschell-Spillman
Hyd—Hydraulic
Idl—Ideal
Ind—Industrial Equipment Co.
Iron—Iron City
J-A—Jackson Radiator Wks.
Jacox—Jackson-Church-Wilcox
Jas—Jamestown Car Pts. Co.
Jhnson—Johnson
Kal—Kalamazoo
K-B—Kinsler-Bennett
Key-H—Keystone-Hindley
King—Kingston
Koko—Kokomo
Lau—Lauraine
Lavn—Lavine
LeR—LeRoi
Lgt—Light Foundry
Ligt—Liggett
L-N—Leece Neville
Lyc—Lycoming
Marvl—Marvel
Mast—Master
McC—McCord
McFar—McFarland
Mech—Mechanics
Merl—Merrill
Mil—Milwaukee
Mnrch—Monarch
Mod—Modine
Mthr—Mather
M&E—Merchant & Evans
Natl—National
N.A.—North American
Nlite—Nicolite
Penn—Penn Spring Co.
P&B—Parish & Bingham
Per—Perfex
Perf—Perfection
Prsh—Parish
R-T—Rome-Turney
Rayfld—Rayfield
Rem—Remy
Rowl—Wm. Harvel Rowland
Rugles—Ruggles
Russl—Russel
Rut—Rutenber
Savg—Savage Arms
Salsby—Salisbury
Schblr—Schebler
Shel—Sheldon
Shkspr—Shakespeare
Smth—A. O. Smith
Spltf—Splitdorf
Stan—Standard Radiator Co.
Stand—Standard Steel Spring Co.
Stewrt—Stewart
Stlg—Sterling
Stmbg—Stromberg
Sundmn—Sunderman
S-W—Sparks-Withington
Therm—Thermoid
Timkn—Timken
Tltsn—Tillotson
Torbn—Torbenson
Tut—Tuthill
Univ—Universal Machine Co.
Wau—Waukesha
West—Westinghouse
Wis—Wisconsin
Wol—Wohlrab

Detailed Technical Specifications of

Name and Model	Tons Capacity	Chassis Price	Wheelbase Inches	FRAME Make	FRAME Material	FRAME Type	TIRES Kind	TIRES Size in Ins. Front	TIRES Size in Ins. Rear	Wheels	ENGINE Make	ENGINE No. Cyl. Bore and Stroke—N.A.C.C. Hp.	ENGINE Cylinders Cast	COOLING Water Circ.	COOLING Radiator Make	COOLING Radiator Core and Case	IGNITION Type	IGNITION Make	IGNITION Spark Advance	ELEC. SYSTEM Type	ELEC. SYSTEM Make	ELEC. SYSTEM Extra Cost $	GOVERNOR Type	GOVERNOR Make	GOVERNOR Drive
Selden....JWB&JWBL	2	.....	150	P&B..	p-stl.	s-flex.	s....	36x4	36x7	wd..	Con..	4-4½x5½-27.2	4	cent...	Bush.	fin-cst..	sing..	Bosch.	fix..	s&l..	N-E..	....	cent..	Pierce...	motor.
Selden.....NL	3½	.....	164	P&B..	p-stl.	s-flex.	s....	36x5	36x5d	wd..	Con..	4-4½x5½-32.4	2	cent...	Bush.	fin-cst..	sing..	Eismn	hand.	s&l..	N-E..	....	cent..	Pierce...	motor.
Selden.....DL	5	.....	170	P&B..	p-stl.	s-flex.	s....	36x6	40x12	c-s..	Con..	4-4½x5½-32.4	2	cent...	Bush.	fin-cst..	sing..	Eismn	hand.	s&l..	N-E	....	cent..	Pierce...	motor.
Seneca.....J	½	.....	108	Savg..	p-stl.	s-flex.	pnu..	30x3½	30x3½	wd..	LeR..	4-3¾x4½-15.6	4	ther...	Fed..	cel-pst..	sing..	Remy.	hand.	sl&i..	Al-Ch.	....	none	none....	none.
Service.....320	1	$2,100	137	own...	p-stl.	flex..	s....	34x3½	34x5	wd..	Buda	4-3½x5½-19.6	4	ther...	Long.	fin-cst..	sing..	Eismn	hand.	opt...	West..	120	none	none....	none.
Service.....340	2	3,000	160	own...	p-stl.	flex..	s....	36x4	36x7	wd..	Buda	4-4½x5½-29.0	4	cent...	Long.	fin-cst..	sing..	Eismn	hand.	opt...	West..	140	cent..	Duplx...	motor.
Service.....370	3½	3,900	171	own...	p-stl.	flex..	s....	36x5	36x5d	wd..	Buda	4-4½x5½-29.0	4	cent...	Long.	fin-cst..	sing..	Eismn	hand.	s&cl-2..	West*.	140	cent..	Duplx...	motor.
Service.....375	3½	4,200	171	own...	p-stl.	flex..	s....	36x5	36x5d	wd..	Buda	4-4½x6 -32.4	4	cent...	Long.	fin-cst..	sing..	Eismn	auto.	s&cl-2..	West*.	140	cent..	Duplx...	motor.
Service.....400	5	5,000	171½	own...	p-stl.	flex..	s....	36x6	40x6d	c-s..	Buda	4-4½x6 -32.4	4	cent...	Long.	fin-cst..	sing..	Bosch.	auto.	none..	none..	none	cent..	Pierce...	motor.
Shaw.....M-3	2	2,700	153	Smith.	p-stl.	rigid.	s....	36x4	36x6	wd..	Con..	4-4½x5½-27.2	4	cent...	Mod.	fin-cst..	sing..	Eismn	fix..	none..	none..	none	cent..	Pierce...	motor.
Signal.....F	1	2,400	144	Prsh..	p-stl.	s-flex.	s....	34x4	36x6	wd..	Con..	4-4½x5½-27.2	4	cent...	Mod.	fin-cst..	sing..	Eismn	fix..	none..	none..	none	cent..	Pierce...	motor.
Signal.....H	1½	2,700	144	Prsh..	p-stl.	s-flex.	s....	34x4	36x8	wd..	Con..	4-4½x5½-27.2	4	cent...	Mod.	fin-cst..	sing..	Eismn	fix..	none..	none..	none	cent..	Pierce...	motor.
Signal.....J	2	3,100	150	Prsh..	p-stl.	s-flex.	s....	36x5	40x5d	wd..	Con..	4-4½x5½-32.4	2	cent...	Mod.	fin-cst..	sing..	Eismn	fix..	none..	none..	none	cent..	.....	motor.
Signal.....M	3½	4,100	168	Prsh..	p-stl.	s-flex.	s....	36x6	40x6d	wd..	Con..	4-4½x6 -36.1	2	cent...	Mod.	fin-cst..	sing..	Eismn	fix..	none..	none..	none	cent..	Pierce...	motor.
Signal.....R	5	5,100	180	Prsh..	p-stl.	s-flex.	s....	36x6	36x6	wd..	Con..	4-4½x5½-27.2	4	cent...	Long.	fin-cst..	sing..	Eismn	fix..	none..	none..	none	cent..	Pierce...	motor.
Standard.....76	2	2,800	140	own...	rol-c.	s-flex.	s....	36x4	36x5d	wd..	Con..	4-4½x5½-32.4	2	cent...	.....	fin-cst..	sing..	Eismn	auto	none..	none..	none	cent..	Pierce...	motor.
Standard.....66	3½	3,675	160	own...	rol-c.	s-flex.	s....	36x5	40x6d	wd..	Con..	4-4½x5½-32.4	2	cent...	.....	fin-cst..	sing..	Eismn	auto	.....	.....	.....	cent..	own....	motor.
Standard.....86	5	4,650	160	own...	rol-c.	s-flex.	s....	36x6	40x6d	wd..	Con..	4-4½x5½-27.2	4	cent...	Bush.	cel-sht..	sing..	Eismn	auto	.....	.....	.....	cent..	own....	motor.
Steele.....C	2	2,500	115	own...	rol-c.	s-flex.	s....	38x5	40x4d	c-s..	own..	4-5 x5 -40.0	2	cent...	Whit.	cel-sht..	sing..	Eismn	auto	.....	.....	.....	cent..	own....	motor.
Steele.....B	3	3,000	127	own...	rol-c.	s-flex.	s....	38x6	40x5d	c-s..	own..	4-5 x5 -40.0	2	cent...	Whit.	cel-sht..	sing..	Eismn	auto	.....	.....	.....	cent..	own....	motor.
Steele.....BA	4	3,500	127	own...	rol-c.	s-flex.	s....	38x6	40x5d	c-s..	own..	4-5 x5 -40.0	2	cent...	Whit.	cel-sht..	sing..	Eismn	auto	.....	.....	.....	cent..	Wau....	motor.
Steele.....A	5	4,000	127	own...	rol-c.	s-flex.	s....	38x7	40x6d	c-s..	own..	4-4½x5½-29.0	2	cent...	own..	cel-cst..	sing..	Eismn	hand.	ltg...	.....	.....	cent..	Wau....	motor.
Sterling.....2½	3½	3,300	156	Smith.	p-stl.	flex..	s....	36x4	36x4d	wi*	own..	4-4½x6½-29.0	2	cent...	own..	cel-cst..	dual..	Eismn	hand.	ltg...	.....	.....	cent..	Wau....	motor.
Sterling.....3½	5	4,325	162	Smith.	p-stl.	flex..	s....	36x5	40x5d	wi*	own..	4-4½x6½-36.1	2	cent...	own..	cel-cst..	dual..	Eismn	hand.	ltg...	.....	.....	cent..	Wau....	motor.
Sterling.....5	5	5,100	168	Smith.	p-stl.	flex..	s....	36x6	40x6d	wi*	own..	4-4½x6½-36.1	2	cent...	own..	cel-cst..	dual..	Eismn	hand.	ltg...	.....	.....	cent..	Wau....	motor.
Sterling.....7	5	5,600	168	Smith.	p-stl.	flex..	s....	36x6	40x7d	c-s..	own..	4-4½x6½-36.1	4	ther...	Fed..	fin-cst..	sing..	Blng...	fix..	.....	.....	.....	.....	.....	.....
Stewart.....6	¾	950	110	Prsh..	p-stl.	s-flex.	pnu..	32x4	32x4	wi..	LeR..	4-3¾x4½-15.6	4	ther...	Bush.	fin-cst..	sing..	Blng...	fix..	.....	.....	.....	.....	.....	.....
Stewart.....8	1	1,575	130	Hyd..	p-stl.	s-flex.	s*....	34x3½	34x4	wi..	Con..	4-3½x5 -19.6	4	ther...	Bush.	fin-cst..	sing..	Blng...	fix..	.....	.....	.....	.....	.....	.....
Stewart.....9	1½	1,975	140	Hyd..	p-stl.	s-flex.	s....	34x3½	34x4d	wi..	Con..	4-4½x5½-22.5	4	cent...	Bush.	fin-cst..	sing..	Blng...	fix..	.....	.....	.....	cent..	Pierce...	motor.
Stewart.....7	2	2,575	156	Hyd..	p-stl.	s-flex.	pnu..	34x4	34x4d	wi..	Con..	4-4½x5½-27.2	4	cent...	McC.	cel-pst..	sing..	Remy.	hand.	sl&i-2.	Wag..	none	.....	.....	.....
Stewart.....SF	½	.....	112	own...	p-stl.	s-flex.	pnu..	35x4½	35x4½	wi..	own..	4-3½x5 -24.2	4	cent...	McC.	cel-pst..	sing..	Remy.	hand.	sl&i-2.	Wag..	none	cent..	Pierce...	motor.
Studebaker.....7	1	.....	125	own...	p-stl.	s-flex.	pnu..	35x5	35x5	wi..	own..	4-3½x5 -24.2	4	ther...	Bush.	fin-sht..	sing..	Bosch.	fix..	.....	.....	.....	.....	.....	.....
Studebaker.....F	1½	2,350	129	own...	rol-c.	s-flex.	s....	36x3	36x5	wi..	Buda	4-3½x4½-22.5	4	cent...	Bush.	fin-sht..	sing..	Bosch.	fix..	.....	.....	.....	.....	.....	.....
Sullivan.....E	2	2,850	150	P&B..	pst..	s-flex.	s....	36x4	36x6	wi..	Buda	4-3½x4½-22.5	4	ther...	Idl...	zz-t-sht..	sing..	Eismn	hand.	none..	none..	none	suc..	Mnrch..	motor.
Sullivan.....A	1	1,600	124	Savg*.	p-stl.	rigid.	p&s*.	34x3½	34x4	wd..	own..	4-3½x5 -19.6	4	cent...	Idl...	zz-t-sht..	sing..	Eismn	hand.	none..	none..	none	suc..	Mnrch..	motor.
Superior.....C	2	2,200	144	Savg*.	p-stl.	rigid.	s....	36x4	36x6	wd..	own..	4-3½x5 -22.5	4												
Tiffin.....A	¾	1,100	110	P&B..	p-stl.	flex..	pnu..	35x4½	35x4½	wd..	Con..	4-3½x5 -19.6	4	ther...	Bush.	fin-sht..	sing..	Bosch.	hand.	none..	none..	none	none	none....	none.
Tiffin.....GW	1½	2,075	135	P&B..	p-stl.	flex..	s....	36x3½	35x3½d	wd..	Con..	4-3½x5½-22.5	4	cent...	Bush.	fin-sht..	sing..	Bosch.	hand.	none..	none..	none	cent..	Pierce...	motor.
Tiffin.....MW	2½	2,750	148	P&B..	p-stl.	s-flex.	s....	36x4	36x5d	wd..	Con..	4-4½x5½-27.2	4	cent...	Bush.	fin-sht..	sing..	Bosch.	hand.	none..	none..	none	cent..	Pierce...	motor.
Tiffin.....PW	3½	3,600	160	own...	rol-c.	s-flex.	s....	36x5	36x5d	wd..	Con..	4-4½x5½-32.4	2	cent...	own..	fin-cst..	sing..	Bosch.	hand.	sl&i-2.	West..	150	cent..	Pierce...	motor.
Tiffin.....RW	5	4,650	168	own...	rol-i.	rigid.	s....	36x6	40x6d	c-s..	Con..	4-4½x5½-32.4	3	cent...	Bush.	fin-sht..	sing..	Bosch.	hand.	sl&i-2.	West..	160	none	none....	none.
Tiffin.....SW	6	4,850	168	own...	rol-i.	rigid.	s....	36x6	40x12	c-s..	Con..	6-3½x5½-33.7	3	cent...	Bush.	fin-sht..	sing..	Bosch.	hand.	sl&i-2.	West..	160	none	none....	none.
Titan.....Transport	3½	4,300	162	P&B..	p-stl.	s-flex.	s....	36x5	40x5d	wd..	Buda	4-4½x6 -32.4	4	cent...	Per..	zz-t-cst..	sing..	Bosch.	hand.	ltg...	Bosch.	.....	cent..	Duplx...	motor.
Titan.....Heavy Duty	6	5,150	156	P&B..	p-stl.	s-flex.	s....	36x6	40x6d	c-s..	Buda	4-4½x6 -32.4	4	cent...	Per..	zz-t-cst..	dual..	Bosch.	hand.	ltg...	Bosch.	.....	cent..	Duplx...	motor.
Tower.....F	2	2,750	146	Dtrt..	p-stl.	flex..	s....	36x4	36x7	wd..	Con..	4-4½x5½-27.2	4	cent...	own..	zz-t-cht..	sing..	Bosch.	hand.	none..	none..	none	none	none....	none.
Traffic.....N	2	1,395	133	.....	rol-c.	s-flex.	s....	34x3½	34x5	wd..	Gray.	4-3½x5 -19.6	4	ther...	Eur..	cel-sht..	sing..	Koko..	hand.	none..	none..	none	suc..	Mnrch..	motor.
Transport Tractor.....A	5	2,750	80	.....	.....	.....	s....	34x3½	34x4d	.....	.....	.....	4	ther...	.....	.....	sing..	Bosch.	fix..	.....	.....	.....	.....	.....	.....
Triangle.....A	1½	2,185	144	.....	rol-c.	s-flex.	s....	34x3½	34x6	wd..	Wau.	4-3½x5½-22.5	4	cent...	Per..	zz-t-pst..	sing..	Eismn	fix..	none..	none..	none	cent..	Wau....	motor.
Union.....B	2½	2,375	152	Smith.	p-stl.	s-flex.	s....	36x4	36x7	wd*	Wis..	4-4 x6 -25.6	4	cent...	own..	fin-c-a..	sing..	Eismn	hand.	none..	none..	none	cent..	Duplx..	duplex
U. S.....E	2½	2,800	144	own...	rol-c.	flex..	s....	34x4	36x4d	wd..	Con..	4-4½x5½-27.2	4	cent...	Long.	fin.....	sing..	Eismn	hand.	.....	.....	.....	cent..	Pierce...	motor.
U. S.....H	2½	3,250	144	own...	rol-c.	flex..	s....	34x4	36x4d	wd..	Con..	4-4½x5½-27.2	4	cent...	Long.	fin-cst..	sing..	Eismn	hand.	.....	.....	.....	cent..	Pierce...	motor.
U. S.....D	3½	3,500	162	own...	rol-c.	flex..	s....	36x5	36x5d	wd..	Con..	4-4 x5½-32.4	2	cent...	Long.	fin-cst..	sing..	Eismn	hand.	.....	.....	.....	cent..	.....	motor.
U. S.....J	3½	3,950	162	own...	rol-c.	flex..	s....	36x5	40x5d	wd..	Con..	4-4½x5½-32.4	2	cent...	Long.	fin-cst..	sing..	Eismn	hand.	.....	.....	.....	cent..	Wau....	motor.
U. S.....K	5	4,850	168	own...	rol-c.	flex..	s....	36x6	40x6d	c-s..	Wau.	4-4½x6½-36.1	2	cent...	Long.	fin-cst..	sing..	Eismn	hand.	.....	.....	.....	cent..	Simpl...	motor.
United.....AX	1½	.....	133	own...	p-stl.	flex..	s....	36x3½	36x6	wd..	Buda	4-3½x5½-22.5	4	cent...	G&O.	fin-cst..	sing..	Eismn	hand.	.....	.....	.....	cent..	Simpl...	motor.
United.....BX	2½	.....	148	own...	p-stl.	flex..	s....	36x4	36x7	wd..	Buda	4-4½x5½-29.0	4	cent...	G&O.	fin-cst..	sing..	Eismn	hand.	.....	.....	.....	cent..	Simpl...	motor.
United.....CX	3½	.....	160	own...	p-stl.	flex..	s....	36x5	36x5d	wd..	Buda	4-4½x6 -32.4	4	cent...	G&O.	fin-cst..	sing..	Eismn	hand.	.....	.....	.....	cent..	Simpl...	motor.
United.....VX	5	.....	160	own...	p-stl.	flex..	s....	36x5	40x6d	c-s..	Buda	4-4½x6 -32.4	4	cent...	G&O.	fin-cst..	sing..	Eismn	hand.	.....	.....	.....	suc..	Mnrch..	motor.
United.....G	1½	.....	133	.....	p-stl.	rigid.	.....	34x3½	34x5	wd..	Buda	4-3½x5½-22.5	4	pist...	Long	fin-cst..	sing..	Eismn	hand.	ltg...	.....	.....	none	suc*..	Mnrch*.	motor.
Universal.....D	2	.....	132	.....	p-stl.	.....	s....	36x5	36x4d	wd..	own..	4-4½x5½-29.0	4	cent...	Long.	fin-cst..	sing..	Eismn	hand.	ltg...	.....	.....	none	suc*..	Mnrch*.	motor.
Universal.....L	3½	.....	156	.....	rol-c.	.....	s....	36x5	36x5d	wd..	Buda	4-4½x5½-29.0	4	cent...	Long.	fin-cst..	sing..	Eismn	hand.	ltg...	.....	.....	none	suc*..	Mnrch*.	motor.
Velie.....25B	2	2,950	150*	.....	.....	.....	s....	36x4	36x7	.....	Con..	4-4½x5½-27.2	4	.....	.....	.....	sing..	Bosch.	hand.	.....	.....	.....	.....	cent..	Pierce...	motor.

ABBREVIATIONS—Types of Construction

*Other Options
amid—amidships
auto—automatic
bevl—bevel
c—center
c&l—center and left
c&s—cushion and solid
cent—centrifugal
c-s—cast steel
c-a—cast aluminum
cel-cst—cellular core, cast case
cel-pst—cellular core, pressed steel case
cel-sht—cellular core, sheet case
chn—chain
cylinders cast, 2 in pairs
cylinders cast, 4 in block
cylinders cast, 3 in threes
cylinders cast, 1 singly
d-d—dry disk
d-p—dry plate
d-rd—double reduction
d-s—driveshaft
elec—electric
ext-d-s—external driveshaft
ext-f-w—external front wheels
ext-g—external gear
ext-jst—external jackshaft
ext-r-w—external rear wheel
fab—fabric
fin—finned tube
fin-c-a—finned tube core, cast aluminum case
fin-cst—finned tube core, cast case
fin-pst—finned tube core, pressed steel case
fin-sht—finned tube core, sheet case
flx—fixed
flex—flexible
fric—friction
g.p.—gear pump
grav—gravity
gset—gearset
hyd—hydraulic
ind-c—individual clutch
int-d-s—internal driveshaft
int-f-w—internal front wheels
in-g—internal gear
in-g-4—internal gear drive on 4 wheels
int-r-w—internal rear wheel
jst—unit with jackshaft
l—left
l&c—left and center
leat—leather
l-b—loose ball
ltg—lighting
metl—metal
mtr—unit with motor
opt—optional
p—plate in oil
pist—piston pump
plan—planetary
pnu—pneumatic
pres—pressure
prog—progressive sliding gearset
p-t-c-a—plain tube core, cast aluminum case
p-t-cst—plain tube core, cast case
p-stl—pressed steel
p&s—pneumatic and solid
r—right
r-ax—unit with rear axle
rng-cst—ring core, cast case
rol-c—rolled channel
rol-i—rolled I-beam
r-rd—radius rods
selec—selective sliding gear
s-flex—semi-flexible
stg—starting
s&l—starting and lighting
s.l&i—starting, lighting and ignition
s l&i2—starting, lighting and ignition, two-unit
sing—single
s—solid
s&c—solid and cushion
spgs—springs
sq-t-cst—square tube core, cast iron
sq-t-sht—square tube core, sheet case
stk—stock
sub-f—sub-frame
suc—suction
s-bev—spiral bevel
ther—thermo-syphon
tor-a—torque arm
t-t—torsion tube
unt-x—unit with axle
vacm—vacuum
wd—wood
w-d—multiple disk in oil
worm—top worm
w-p—wet plate
zz-t-cst—zig zag tube core, cast case
zz-t-pst—zig zag tube core, pressed steel case
zz-t-sht—zig-zag tube core, sheet case

Gasoline Motor Trucks for 1919—Continued

ENGINE						TRANSMISSION										BRAKES		CONTROL			UNIVERSALS		
SPEED		FUEL SYS.		CLUTCH		GEARSET				FINAL DRIVE								STEERING GEAR					
Motor in R.p.m.	Truck in M.p.h.	Carbureter Make	Fuel Feed	Type	Make	Type	Make	Placed	Speeds	Type	Axle Make	Total Gear Reduction	Propulsion Taken By	Torque Taken By	Springs Make	Foot	Hand	Placed	Make	Levers	Type	Make	Name and Model
1,295	20	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	4	worm.	Timkn.	9.25	spgs...	spgs...	Perf...	int-r-w.	int-r-w.	r....	Jaoox.	c....	metl..	Spicer..	Selden....JWB&JWBL
1,295	11	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	4	worm.	Timkn.	10.33	r-rd....	spgs...	Perf...	int-r-w.	int-r-w.	r....	Ross..	c....	metl..	Spicer..	Selden.....NL
1,295	11	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	13.66	r-rd....	spgs...	Perf...	int-r-w.	int-r-w.	r....	Ross..	c....	metl..	Spicer..	Selden.....DL
2,200	.....	Schblr..	vacm..	d-d...	Dtrt...	selec...	Dtrt...	mtr...	3	bevel.	Adams.	4.25	spgs...	tor-a...	Cant...	int-r-w.	ext-r-w.	l....	Ditw..	c....	metl..	Univ...	Seneca.....J
1,400	16	Stmbg..	vacm..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	worm.	Timkn.	7.75	spgs...	spgs...	.....	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Arvac..	Service.....320
1,100	15	Stmbg..	grav..	d-p...	B-Beck.	selec...	B-Lipe.	amid..	3	worm.	Timkn.	7.75	spgs...	spgs...	.....	int-r-w	int-r-w.	l....	Ross..	c....	metl*	own*...	Service.....340
1,100	13	Stmbg..	grav..	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	8.75	spgs...	spgs...	.....	int-r-w	int-r-w.	l....	Ross..	c....	metl*	own*...	Service.....370
1,000	13	Stmbg..	grav..	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	7.8	spgs...	spgs...	.....	int-r-w.	int-r-w.	l....	Ross..	c....	metl*	own*...	Service.....375
1,000	11½	Stmbg..	grav..	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	10.25	r-rd....	spgs...	.....	int-r-w.	int-r-w.	l....	Ross..	c....	metl*	own*...	Service.....400
1,275	16	Zenith..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm.	Timkn.	8.5	spgs...	spgs...	Perf...	int-r-w.	int-r-w.	l....	Gem...	c....	metl..	Spicer..	Shaw.....M-3
1,085	15	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	7.7	r-rd....	spgs...	Perf*.	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Spicer..	Signal.....F
1,300	15	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	9.25	r-rd....	spgs...	Perf...	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Spicer.	Signal.....H
1,300	15	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	9.25	r-rd....	spgs...	Perf...	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Spicer..	Signal.....J
1,300	15	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	12	r-rd....	spgs...	Perf...	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Spicer..	Signal.....M
1,200	12	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	11.66	r-rd....	spgs...	Perf...	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Spicer..	Signal.....R
1,500	15	Schblr..	grav..	d-p...	B-Beck.	prog...	Covert.	amid..	3	worm.	Timkn.	11.62	r-rd....	tor-a...	Tut...	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Spicer..	Standard.....70
1,200	12	Schblr..	vacm..	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	10.33	r-rd....	tor-a...	Tut...	int-r-w.	int-r-w.	l....	Gem...	c....	metl..	Spicer..	Standard.....65
1,000	10	Schblr..	vacm..	d-p...	B-Beck.	prog...	B-Lipe.	amid..	4	worm.	Timkn.	11.66	r-rd....	tor-a...	Tut...	int-r-w.	int-r-w.	l....	Gem...	c....	metl..	Spicer..	Standard.....85
1,100	14	Stmbg..	grav..	w-d...	H-Shaw	ind-c...	Cotta..	jst....	3	chn...	own...	.....	r-rd....	.....	.....	.....	int-r-w.	r....	Gem...	r....	metl..	own...	Steele.....C
900	12	Stmbg..	grav..	w-d...	H-Shaw	ind-c...	Cotta..	jst....	3	chn...	own...	.....	r-rd....	.....	Del....	ext-jst.	int-r-w.	r....	Ross..	r....	metl..	own...	Steele.....B
900	9	Stmbg..	grav..	w-d...	H-Shaw	ind-c...	Cotta..	jst....	3	chn...	own...	.....	r-rd....	.....	Del....	ext-jst.	int-r-w.	r....	Ross..	r....	metl..	own...	Steele.....BA
900	9	Stmbg..	grav..	w-d...	H-Shaw	ind-c...	Cotta..	jst....	3	chn...	own...	.....	r-rd....	.....	Del....	ext-jst.	int-r-w.	r....	Ross..	r....	metl..	own...	Steele.....A
1,010	16	Zenith..	grav..	w-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm.	Shel...	7.7	spgs...	spgs...	Shel...	int-r-w.	int-r-w	l....	Ross..	c....	metl..	Spicer.	Sterling.....
1,000	13	Rayfld..	vacm..	w-d...	H-Shaw	ind-c...	own...	amid..	3	worm.	Timkn.	8.75	r-rd....	spgs...	Mthr...	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Spicer.	Sterling.....
950	13	Rayfld..	vacm..	w-d...	H-Shaw	ind-c...	own...	amid..	3	worm.	Timkn.	8.8	r-rd....	spgs...	Mthr...	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Spicer.	Sterling.....
900	12	Rayfld..	vacm..	w-d...	H-Shaw	ind-c...	own...	jst....	3	chn...	own...	10.65	r-rd....	.....	Mthr...	ext-jst	int-r-w.	l....	Ross..	c....	metl..	Univ...	Sterling.....
1,400	22	Zenith..	grav..	d-p...	Mech..	selec...	Mech...	mtr...	3	in-g...	Clark..	5.8	spgs...	spgs...	Dtrt...	ext-r-w.	ext-r-w.	l....	C.A.S.	c....	fab....	.....	Stewart.....6
1,200	20	Zenith..	grav..	d-p...	B-Beck.	selec...	Fuller..	mtr...	3	in-g...	Clark..	5.8	spgs...	spgs...	Dtrt...	ext-r-w.	ext-d-s.	l....	Gem...	c....	metl..	Hart...	Stewart.....8
1,250	18	Zenith..	grav..	d-p...	Fuller..	selec...	Fuller..	mtr...	3	in-g...	Clark..	7	spgs...	spgs...	Dtrt...	ext-r-w.	ext-d-s.	l....	Gem...	c....	metl..	Hart...	Stewart.....7
1,100	14	Zenith..	grav..	d-p...	Fuller..	selec...	Fuller..	mtr...	3*	in-g...	Clark..	8.15	spgs...	spgs...	Dtrt...	ext-r-w.	ext-d-s.	l....	Ross..	c....	metl..	Hart...	Stewart.....9
.....	.....	Schblr..	vacm..	cone..	own...	selec...	own...	r-ax..	3	bevl...	own...	4.6	r-rd....	tor-a...	own...	int-r-w.	ext-r-w.	l....	Gem*.	c....	metl..	own...	Studebaker.....SF
960	20	Schblr..	vacm..	cone..	own...	selec...	own...	r-ax..	3	bevl...	own...	5.	r-rd....	tor-a...	own...	int-r-w.	ext-r-w.	l....	Gem...	c....	metl..	own...	Studebaker.....7
.....	.....	Stmbg..	grav..	cone..	Hart...	selec...	Covert.	amid..	3	worm	Timkn.	8.5	spgs...	spgs...	Merl...	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Hart...	Sullivan.....F
.....	.....	Stmbg..	vacm..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm	Timkn	7.75	spgs...	spgs...	Shel...	int.....	int.....	l....	Ross..	c....	metl..	Blood..	Sullivan.....E
1,200	16	Stmbg..	vacm..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	in-g...	Torb...	7	spgs...	spgs...	Tut...	ext-r-w.	int-r-w.	l....	C.A.S.	c....	metl..	Arvac..	Superior.....A
1,300	15	Stmbg..	vacm..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	in-g...	Torb...	9	spgs...	spgs...	Tut...	ext-d-s.	int-r-w.	l....	Ross..	c....	metl..	Arvac..	Superior.....C
.....	.....	Schblr..	grav..	cone..	Detrt..	selec...	Detrt..	mtr...	3	in-g...	Russl...	6.8	spgs...	spgs...	Kal....	int-r-w.	ext-r-w.	l....	Lavn..	c....	metl..	Acme..	Tiffin.....A
1,000	12.5	Schblr..	grav..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	worm	Shel...	8.6	spgs...	spgs...	Kal....	ext-r-w.	int-r-w.	l....	Ross..	c....	metl..	Acme..	Tiffin.....GW
1,000	13	Schblr..	grav..	cone..	Hart...	selec...	Covert.	amid..	3	worm	Timkn	9.12	r-rd....	spgs...	Kal....	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Acme..	Tiffin.....MW
1,000	9	Schblr..	grav..	d-p...	B-Beck.	selec...	Covert.	amid..	3	worm	Shel...	11.7	r-rd....	spgs...	Kal....	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Acme..	Tiffin.....PW
1,000	10	Schblr..	grav..	d-p...	B-Beck.	selec...	Covert.	amid..	3	worm	Shel...	11.7	r-rd....	spgs...	Kal....	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Acme..	Tiffin.....RW
1,000	9	Schblr..	grav..	d-p...	B-Beck.	selec...	Covert.	amid..	3	worm	Shel...	13	r-rd....	spgs...	Kal....	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Acme..	Tiffin.....SW
1,000	16	Stmbg..	grav..	d-p...	B-Beck.	ind-c...	Cotta..	amid..	3	in-g...	Clark..	8	r-rd....	spgs...	Shel...	ext-r-w.	int-r-w.	l....	Lavn..	c....	metl..	.....	Titan.....Transport
1,000	12	Stmbg..	grav..	d-p...	B-Beck.	ind-c...	Cotta..	amid..	3	in-g...	Clark..	11	r-rd....	spgs...	Shel...	int-r-w.	int-r-w.	l....	Lavn..	c....	metl..	.....	Titan.....Heavy Duty
.....	15	Stmbg..	grav..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	worm	Timkn.	8.5	r-rd....	tor-a...	Dtrt...	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Spicer.	Tower.....P
1,500	15	Carter..	grav..	d-p...	B-Beck.	selec...	Cover...	mtr...	3	in-g...	Russl...	8.2	spgs...	spgs...	Dtrt...	ext-r-w.	int-r-w.	l....	Ditw..	c....	metl..	Arvac..	Traffic.....
.....	12	Zenith..	grav..	d-d...	.....	selec...	.....	mtr...	4	worm	.....	.....	spgs...	spgs...	.....	int-r-w.	int-r-w.	.....	.....	.....	.....	.....	Transport Tractor.....N
1,350	18	Stmbg..	grav..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	in-g...	Clark..	6.8	spgs...	spgs...	Dtrt...	ext-d-s.	ext-r-w.	l....	Gem...	c....	metl..	Univ...	Triangle.....A
1,100	.....	Schblr..	grav..	d-d...	Fuller..	selec...	Fuller..	mtr...	4	in-g...	Russl...	7.8	spgs...	spgs...	Mthr...	ext-r-w.	int-r-w.	r....	Ross..	c....	metl..	Univ...	Union.....B
1,160	.....	Stmbg..	grav..	cone..	Hart...	ind-c...	Cotta..	amid..	3	chn...	own...	8.16	r-rd....	.....	Tut...	ext....	int-r-w.	l....	Lavn..	c....	metl..	Hart...	U. S.....E
1,160	.....	Stmbg..	grav..	cone..	Hart...	selec...	B-Lipe.	amid..	4	worm	Shel...	7.75	spgs...	spgs...	Shel...	int-r-w.	int-r-w.	l....	Lavn..	c....	metl..	Hart...	U. S.....H
1,090	.....	Stmbg..	grav..	cone..	Hart...	selec...	B-Lipe.	amid..	4	chn...	own...	8.01	r-rd....	.....	Tut...	ext....	int.....	l....	Lavn..	c....	metl..	Hart...	U. S.....D
1,090	.....	Stmbg..	grav..	cone..	Hart...	selec...	B-Lipe.	amid..	4	worm	Shel...	10.25	spgs...	spgs...	Shel...	int.....	int.....	l....	Lavn..	c....	metl..	Blood*.	U. S.....J
950	.....	Stmbg..	grav..	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	worm	Shel...	8.75	r-rd....	spgs...	Shel...	int.....	int.....	r....	Lavn..	c....	metl..	Blood*.	U. S.....K
1,078	15	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm	Shel...	7.7	spgs...	spgs...	.....	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Blood..	United.....AX
1,007	14	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm	Shel...	7.75	r-rd....	spgs...	.....	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Blood..	United.....BX
1,055	13	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm	Shel...	8.7	r-rd....	spgs...	.....	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Blood..	United.....CX
1,033	12	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm	Shel...	10.25	r-rd....	spgs...	.....	int-r-w.	int-r-w.	l....	Ross..	c....	metl..	Blood..	United.....VX
1,160	15	Zenith..	grav..	d-p...	own...	selec...	own...	mtr...	3	worm	own...	.....	r-rd....	tor-a...	Kal....	int-r-w.	int-r-w.	l....	Lavn..	c....	.....	.....	Universal.....G
1,100	12	Zenith..	grav..	d-d...	own...	selec...	own...	amid..	3	chn...	own...	.....	r-rd....	.....	Kal....	int-r-w.	int-r-w.	r....	Lavn..	r....	.....	.....	Universal.....D
1,000	12	Zenith..	grav..	d-d...	own...	selec...	own...	amid..	3	chn...	own...	.....	r-rd....	.....	Kal....	int-r-w.	int-d-s	r....	Lavn..	r....	.....	.....	Universal.....L
1,008	18	Stmbg..	vacm..	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	worm	Timkn.	7.7	spgs...	spgs...	Mthr...	int-r-w.	int-r-w.	.....	Gem...	.....	.....	Spicer.	Velie.....25A

ABBREVIATIONS—Makers of Parts

*Other Options
A-K—Atwater-Kent
Al-Ch—Allis-Chalmers
Aut-L—Auto-Lite
B-Beck—Borg & Beck
B-Lipe—Brown-Lipe
Bing—Berling
Brem—Bremer
Can—Candler
Cant—Canton-Cleveland
CAS—C.A.S. Products Co.
Champ—Champion Spng.
Chcgo—Chicago-Stndrd.
Chgo—Chicago Mfg. Co.
Con—Continental
Conn—Connecticut
Cover—Covert
Del—Delany
Ditw—Ditweiler
Dneto—Dyneto
Dtrt—Detroit Press. Stl.
Dtrt—Detroit Lubricat.
Dtrt—Detroit G. & M. Co.
Dtrt—Detroit Stl. Spng.
Duplx—Duplex
E&M—English & Mersick
Eismn—Eisemann
Emp—Empire
Ens—Ensign
Eur—Eureka
Fed—Fedders
Flech—Fletcher
Fost—Foster
Franck—Francke
G&D—Gray & Davis
G&O—G. & O. Mfg. Co.
GBS—Golden, Belknap & Swartz
G-Lees—Grant-Lees
Gem—Gemmer
H&N—H. & N. Carburetor Co.
Har—Harrison
Hart—Hartford
Hays—Hayes
Her—Hercules
Hig—Higgins
Hol—Holley
H-Shaw—Hele-Shaw
H-S—Herschell-Spillman
Hyd—Hydraulic
Idl—Ideal
Ind—Industrial Equipment Co.
Iron—Iron City
J-A—Jackson Radiator Wks.
Jacox—Jackson-Church-Wilcox
Jas—Jamestown Car Pts. Co.
Jhnson—Johnson
Kal—Kalamazoo
K-B—Kinsler-Bennett
Key-H—Keystone-Hindley
King—Kingston
Koko—Kokomo
Lau—Lauraine
Lavn—Lavine
LeR—LeRoi
Lgt—Light Foundry
Ligt—Liggett
L-N—Leece Neville
Lyc—Lycoming
Marvl—Marvel
Mast—Master
McC—McCord
McFar—McFarland
Mech—Mechanics
Merl—Merrill
Mil—Milwaukee
Mnrch—Monarch
Mod—Modine
Mthr—Mather
M&E—Merchant & Evans
Natl—National
N.A.—North American
N-E—North East
Nlite—Nicolite
Penn—Penn Spring Co.
P&B—Parish & Bingham
Per—Perfex
Perf—Perfection
Prsh—Parish
R-T—Rome-Turney
Rayfld—Rayfield
Rem—Remy
Rowl—Wm. Harvel Rowland
Ruggles—Ruggles
Russl—Russel
Rut—Rutenber
Savg—Savage Arms
Salsby—Salisbury
Schblr—Schebler
Shel—Sheldon
Shkspr—Shakespeare
Smth—A. O. Smith
S-P—Spring-Pereh
Spltf—Splitdorf
Stan—Standard Radiator Co.
Stand—Standard Steel Spring Co.
Stewrt—Stewart
Stlg—Sterling
Stmbg—Stromberg
Sundmn—Sunderman
S-W—Sparks-Withington
Therm—Thermoid
Timkn—Timken
Tltsn—Tillotson
Torbn—Torbenson
Tut—Tuthill
Univ—Universal Machine Co.
Wau—Waukesha
West—Westinghouse
Wis—Wisconsin
Wol—Wohlrab
W-W—Walker-Weiss

Detailed Technical Specifications of

Name and Model	Tons Capacity	Chassis Price	Wheelbase, Inches	FRAME: Make	FRAME: Material	FRAME: Type	TIRES: Kind	TIRES: Size in Ins. Front	TIRES: Size in Ins. Rear	Wheels	ENGINE: Make	ENGINE: No. Cyl., Bore and Stroke—N.A.C.C. Hp.	ENGINE: Cylinders Cast	COOLING: Water Circ.	COOLING: Radiator Make	COOLING: Radiator Core and Case	IGNITION: Type	IGNITION: Make	IGNITION: Spark Advance	ELEC. SYSTEM: Type	ELEC. SYSTEM: Make	ELEC. SYSTEM: Extra Cost, $	GOVERNOR: Type	GOVERNOR: Make	GOVERNOR: Drive
Velie 26B	3½	$3,900	172*	.....	.....	.....	s....	36x5	36x5d	....	Con..	4-4½x5½-32.4	2	.....	.....	.....	sing..	Bosch.	hand.	.....	.....	.....	cent..	Pierce...	motor.
Vim 21	½	945	108	Prsh..	p-stl..	s-flex.	pnu..	31x4	31x4	wd..	own..	4-3 x4½-14.4	4	ther...	McC.	cel-pst...	sing..	Spltf..	hand.	ltg....	West..	.....	.....	.....	.....
Vim 25	1	2,195	120	.....	p-stl..	s-flex.	opt..	34x3½	34x4	wd..	Con..	4-3½x5 -22.5	4	cent...	.....	fin-cst...	sing..	Spltf..	hand.	.....	.....	.....	cent..	Duplx...	motor.
Vim 22	2	3,465	142	.....	p-stl..	s-flex.	s....	36x4	36x6	wd..	Her..	4-3½x5½-22.5	4	cent...	McC.	fin-cst...	sing..	Spltf..	hand.	.....	.....	.....	cent..	Duplx...	motor.
Vim 23	3	4,345	175	.....	p-stl..	s-flex.	s....	36x4	36x4d	wd..	Her..	4-4½x5½-29.0	4	cent...	McC.	fin-cst...	sing..	Spltf..	hand.	.....	.....	.....	cent..	Duplx...	motor.
Walter MO	3	.....	108	.....	rol-c..	.....	s....	40x4d	40x4d	c-s..	own..	4-4½x6 -30.6	4	cent...	.....	cel-sht..	sing..	.....	hand.	none..	none..	none	cent..	own....	motor.
Walter F	5	5,700	140	own...	p-stl..	flex..	s....	40x7	40x10	c-s..	own..	4-4½x6½-32.4	2	cent...	own..	fin-c-a..	sing .	Eismn	hand.	s&i-2.	West..	none	cent..	own....	motor.
Watson S-ton Tractor	5	4,050	80	own...	rol-c..	.....	s....	34x4	36x5d	wd..	Con..	4-4½x5½-32.4	2	cent...	Fed..	cel-sht..	dual..	Bosch.	hand.	none..	none..	none	cent..	Pierce...	motor.
Weir-Smith	3½	.....	153	own...	rol-c..	rigid.	s....	37x7	37x7	wd..	Con..	4-4½x5½-32.4	4	cent...	Long.	.....	dual..	Dixie..	.....	.....	.....	.....	.....	.....	.....
White GBBE	3	2,300	133	.....	p-stl..	.....	pnu..	34x4½	34x4½	wd..	own..	4-3½x5½-22.5	4	cent...	.....	cel-sht..	sing..	Eismn	hand.	s&l...	opt....	.....	none.	none....	none..
White TBC	1½	3,300	145	.....	p-stl..	.....	p&s..	36x4	36x4d	wd..	own..	4-3½x5½-22.5	4	cent...	.....	cel-sht..	sing..	Eismn	hand.	s&l...	opt....	.....	.....	.....	.....
White T	3	4,100	174	own...	.....	.....	s....	36x5	40x5d	c-s..	own..	4-3½x5½-22.5	4	cent...	.....	.....	sing.	.....	.....	.....	.....	.....	.....	.....	.....
White TG	5	5,000	174	own...	.....	.....	s....	36x6	40x6d	c-s..	own..	4-4½x5½-29.0	4	cent...	.....	.....	sing..	.....	.....	.....	.....	.....	.....	.....	.....
White-Hickory H	1½	2,400	144	Smith.	p-stl..	s-flex.	s....	36x3½	36x5	wd..	Con..	4-3½x5 -22.5	4	cent...	Chgo	cel-pst...	sing..	Eismn	fix....	none..	none..	none	cent..	Pierce...	motor.
Wichita A	1	1,850	144	own...	p-stl..	flex..	s....	36x3	36x4	wd..	own..	4-3½x5 -19.6	4	ther...	Per..	cel-cst...	sing..	Bosc*.	hand.	ltg....	Bosch.	125	none.	none....	none..
Wichita K	1	2,000	144	own...	p-stl..	flex..	s....	36x3	36x4	wd..	own..	4-3½x5 -19.6	4	ther...	Per..	cel-cst...	sing..	Bosc*.	hand.	ltg....	Bosch.	125	none.	none....	none..
Wichita L	1½	2,350	144	own...	p-stl..	flex..	s....	36x3½	36x5	wd..	own..	4-3½x5 -19.6	4	ther...	Per..	cel-cst...	sing..	Bosc*.	hand.	ltg....	Bosch.	125	none.	none....	none..
Wichita B	2	2,500	144	own...	p-stl..	flex..	s....	36x3½	36x6	wd..	own..	4-3½x5 -19.6	4	ther...	Per..	cel-cst...	sing..	Bosc*.	hand.	ltg....	Bosch.	125	none.	none....	none..
Wichita R	2½	2,950	144	own...	p-stl..	flex..	s....	36x4	36x7	wd.	Wau.	4-3½x5½-22.5	4	cent...	Per..	cel-cst...	sing..	Bosc*.	hand.	ltg....	Bosch.	125	l-b...	Wau....	motor.
Wichita O	3½	3,750	165	own...	p-stl..	flex..	s....	36x5	36x5d	c-s..	Wau.	4-4½x5½-32.4	2	cent...	E&M	cel-sht...	sing..	Bosc*.	hand.	ltg....	Bosch.	125	cent..	Wau....	motor.
Wichita Q	5	4,600	165	own...	p-stl..	flex..	s....	36x6	36x6d	c-s..	Wau.	4-4½x5½-32.4	2	cent...	E&M	cel-sht...	sing..	Bosc*.	hand.	ltg....	Bosch.	125	cent..	Wau....	motor.
Wilcox A	1	2,100	128	Smith.	p-stl..	s-flex.	p&s..	35x5	35x5	wd..	Con..	4-3½x5 -22.5	4	ther...	Long.	fin-cst...	sing..	Bosch.	hand.	none..	none..	none	cent..	Pierce...	motor.
Wilcox X	1½	2,775	144	Smith.	p-stl..	s-flex.	s....	36x4	36x5	c-s..	own..	4-4½x5 -29.0	2	cent...	Long.	fin-c-a...	sing..	Bosch.	hand.	none..	none..	none	cent..	Pierce...	motor.
Wilcox C	2½	3,250	150	Smith.	p-stl..	s-flex.	s....	36x4	36x3½d	wd*.	own..	4-4½x5 -29.0	2	cent...	Long.	fin-c-a...	sing..	Bosch.	hand.	none..	none..	none	cent..	Pierce...	motor.
Wilcox D	3½	3,950	154	Smith.	p-stl..	s-flex.	s....	36x5	36x5d	wd*	own..	4-4½x5 -29.0	2	cent...	Long.	fin-c-a...	.....	Bosch.	hand.	.....	.....	.....	cent..	Pierce...	motor.
Wilcox W	5	5,100	162	Smith.	p-stl..	s-flex.	s....	36x5	40x12	c-s..	Wau.	4-4½x6½-36.1	2	cent...	Long.	fin-c-a...	.....	Bosch.	hand.	none..	none..	none	cent..	Wau....	motor.
Wilson	1	1,750	124	own...	p-stl..	s-flex.	p&s*.	35x5	35x5	wd..	own..	4-3½x5 -19.6	4	ther...	own..	cel-sht...	sing..	Eismn	hand.	opt...	opt...	opt.	cent..	Pierce...	motor.
Wilson	2	2,800	144	own...	rol-c..	s-flex.	s....	36x4	36x4d	wd..	own..	4-4½x5½-27.2	4	cent...	own..	fin-cst...	sing..	Eismn	fix....	opt...	opt...	opt.	cent..	Pierce...	motor.
Wilson	3½	3,800	160	own...	rol-c..	s-flex.	s....	36x5	36x5d	wd..	own..	4-4½x5½-32.4	2	cent...	own..	fin-cst...	dual..	Eismn	hand.	opt...	opt...	opt.	cent..	Pierce...	motor.
Winther 38	1½	2,250	132	own...	rol-c..	s-flex.	s....	34x3½	34x6	c-s..	Wis..	4-3½x5 -22.5	4	cent...	Brm.	fin-cst...	sing..	Eismn	hand.	s&l...	Bijur*.	200	cent..	Simplex.	motor.
Winther 48	2	3,200	150	own...	rol-c..	s-flex.	s....	36x4	36x4d	c-s..	Wis..	4-4 x6 -25.6	4	cent...	Brm.	fin-cst...	sing..	Eismn	hand.	s&l...	Bijur*.	200	cent..	Simplex.	motor.
Winther 68	3	3,900	150	own...	rol-c..	s-flex.	s....	36x5	36x5d	c-s..	Wis..	4-4 x6 -25.6	4	cent...	Brm.	fin-cst...	sing..	Eismn	hand.	s&l...	Bijur*.	200	cent..	Simplex.	motor.
Winther 88	4	4,300	156	own...	rol-c..	s-flex.	s....	36x5	40x5d	c-s..	Wis..	4-4½x6 -29.0	4	cent...	Brm.	fin-cst...	sing..	Eismn	hand.	s&l...	Bijur*.	200	cent..	Simplex.	motor.
Winther 108	5	5,000	162	own...	rol-c..	s-flex.	s....	36x6	40x6d	c-s..	Wis..	4-4½x5½-36.1	2	cent...	Brm.	fin-cst...	sing..	Eismn	hand.	s&l...	Bijur*.	200	cent..	Simplex.	motor.
Winther 128	6	5,250	162	own...	rol-c..	s-flex.	s....	36x6	40x12	c-s..	Wis..	4-5½x6 -42.2	2	cent...	Brm.	fin-cst...	sing..	Eismn	hand.	s&l...	Bijur*.	200	cent..	Simplex.	motor.
Winther 148	7	5,500	162	own...	rol-c..	s-flex.	s....	36x6	40x7d	c-s..	Wis..	4-5½x6 -42.2	2	cent...	Brm.	fin-cst...	sing..	Eismn	hand.	ltg....	Bijur*.	200	cent..	Simplex.	motor.
Wisconsin B	1½	1,750	136	Smith.	p-stl..	s-flex.	s....	34x3½	34x4	wd..	Wau.	4-3½x5½-19.6	4	cent...	Chgo	cel-sht...	sing..	Eismn	hand.	none..	none..	none	cent..	Wau....	motor.
Wisconsin C	2½	2,850	156	Smith.	p-stl..	s-flex.	s....	36x4	36x6	wd.	Wau.	4-4 x5½-25.6	2	cent...	Chgo	cel-sht...	sing..	Eismn	hand.	none..	none..	none	cent..	Wau....	motor.
Witt-Will WD-16	1	2,000	120	.....	p-stl..	s-flex.	s*..	36x3*	36x4*	wd.	Con..	4-3½x5½-22.5	4	cent...	Natl.	sq-t-sht...	sing..	Eismn	auto.	.....	.....	.....	cent..	Pierce...	motor.
Witt-Will WD-18	2½	2,950	144	.....	p-stl..	s-flex.	s*..	36x3½*	36x3½d*	wd.	Con..	4-4½x5½-27.2	4	cent...	Natl.	cel-sht...	sing..	Eismn	auto.	.....	.....	.....	cent..	Pierce...	motor.
Wolverine C	1½	2,250	140	P&B..	p-stl..	s-flex.	s....	34x3½	34x5	wd..	Con..	4-3½x5 -22.5	4	ther...	Long.	fin-cst...	sing..	Spltf..	hand.	s&l-2..	G&D..	none	suc..	Mnrch..	motor.

Received Too Late to Classify

Kimball 2A	1½	.....	.....	.....	p-stl..	flex..	s....	36x3½	36x5	c-s..	Wis..	4-4 x5 -25.6	4	cent...	Flexo	cel-pst...	sing..	Eismn	hand.	.....	.....	.....	cent..	Simplex.	motor.
Kimball 4A	2	.....	154	.....	p-stl..	flex..	s....	36x4	36x6	c-s..	Wis..	4-4 x6 -25.6	4	cent...	Flexo	cel-pst...	sing..	Eismn	hand.	.....	.....	.....	cent..	Simplex.	motor.
Kimball 6A	2½	.....	154*	.....	p-stl..	flex..	s....	36x4	36x7*	c-s..	Wis..	4-4½x6 -29.0	4	cent...	Flexo	cel-pst...	sing..	Eismn	hand.	.....	.....	.....	cent..	Simplex.	motor.
Kimball 8A	4	.....	164	.....	p-stl..	flex..	s....	36x5	40x5d	c-s..	Wis..	4-4½x5½-36.1	2	cent...	Flexo	cel-pst...	sing..	Eismn	hand.	.....	.....	.....	cent..	Simplex.	motor.
Kimball 10A	5	.....	164	.....	p-stl..	flex..	s....	36x6	40x6d	c-s..	Wis..	4-5.1x5½-41.6	2	cent...	Flexo	cel-pst...	sing..	Eismn	hand.	.....	.....	.....	cent..	Simplex.	motor.
Mack Tractor AB	5	.....	120	.....	p-stl..	s-flex.	s....	36x4	36x4d	wd..	own..	4-4 x5 -25.6	2	cent...	own..	cel-sht...	sing..	Spltf..	hand.	opt...	opt.....	.....	cent..	own....	motor.
Patriot	1½	2,150	135	.....	p-stl..	.....	s....	34x3½	34x5	wd..	Con..	4-3½x5 -22.5	....	ther...	.....	fin-cst...	sing..	.....	.....	.....	.....	.....	cent..	Pierce...	motor.
Patriot	2½	3,150	156	.....	p-stl..	.....	s....	34x4	34x7	wd..	Con..	4-4½x5½-27.2	....	cent...	.....	fin-cst...	sing..	.....	.....	.....	.....	.....	cent..	Pierce...	motor.
Texan	1½	1,375	...	.....	.....	.....	p&s..	34x4	34x4	wd..	Lyc..	.....	....	.....	.....	.....	.....	.....	.....	s,l&i.	Dneto.	none	.....	.....	.....

Steam Vehicles

Name and Model	Capacity in Pounds	Price of Chassis	Wheelbase in Inches	FRAME: Material	FRAME: Construction	TIRES: Kind	TIRES: SIZE IN INCHES Front	TIRES: SIZE IN INCHES Rear	Wheels	BOILER: Location	BOILER: Type	BOILER: Heating Surface in Sq. In.	BOILER: Horsepower	BOILER: BURNER Type	BOILER: BURNER Regulation	BOILER: PRESSURE Normal in Lbs.	BOILER: PRESSURE Maximum in Lbs.	WATER: Water Capacity in Gal.	WATER: CONDENSER Type	WATER: CONDENSER Circulation
Steam	10,000	$5,500	157	p-stl..	.....	solid...	36x5	36x10	wood...	under hood	Wat-tube..	21,600	40	atomiz..	auto..	700	6000	25	fin-cst...	ther....

ABBREVIATIONS—Types of Construction

*Other Options
amid—amidships
auto—automatic
bevl—bevel
c—center
c&l—center and left
c&s—cushion and solid
cent—centrifugal
c-s—cast steel
c-a—cast aluminum
cel-cst—cellular core, cast case
cel-pst—cellular core, pressed steel case
cel-sht—cellular core, sheet case
chn—chain
cylinders cast, 2 in pairs
cylinders cast, 4 in block
cylinders cast, 3 in threes
cylinders cast, 1 singly
d-d—dry disk
d-p—dry plate
d-rd—double reduction
d-s—driveshaft
elec—electric
ext-d-s—external driveshaft
ext-f-w—external front wheels
ext-g—external gear
ext-jst—external jackshaft
ext-r-w—external rear wheel
fab—fabric
fin—finned tube
fin-c-a—finned tube core, cast aluminum case
fin-cst—finned tube core, cast case
fin-pst—finned tube core, pressed steel case
fin-sht—finned tube core, sheet case
fix—fixed
flex—flexible
fric—friction
g.p.—gear pump
grav—gravity
gset—gearset
hyd—hydraulic
ind-c—individual clutch
int-d-s—internal drive-shaft
int-f-w—internal front wheels
in-g—internal gear
in-g-4—internal gear drive on 4 wheels
int-r-w—internal rear wheel
jst—unit with jackshaft
l—left
l&c—left and center
leat—leather
l-b—loose ball
ltg—lighting
metl—metal
mtr—unit with motor
opt—optional
p—plate in oil
plst—piston pump
plan—planetary
pnu—pneumatic
pres—pressure
prog—progressive sliding gearset
p-t-c-a—plain tube core, cast aluminum case
p-t-cst—plain tube core, cast case
p-stl—pressed steel
p&s—pneumatic and solid
r—right
r-ax—unit with rear axle
rng-cst—ring core, cast case
rol-c—rolled channel
rol-i—rolled I-beam
r-rd—radius rods
selec—selective sliding gear
s-flex—semi-flexible
stg—starting
s&i—starting and lighting
s,l&i—starting, lighting and ignition
s l&i2—starting, lighting and ignition, two-unit
sing—single
s—solid
s&c—solid and cushion
spgs—springs
sq-t-cst—square tube core, cast iron
sq-t-sht—square tube core, sheet case
stk—stock
sub-f—sub-frame
suc—suction
s-bev—spiral bevel
ther—thermo-syphon
tor-a—torque arm
t-t—torsion tube
unt-x—unit with axle
vacm—vacuum
w-d—wood
w-d—multiple disk in oil
worm—top worm
w-p—wet plate
zz-t-cst—zig zag tube core, cast case
zz-t-pst—zig zag tube core, pressed steel case
zz-t-sht—zig-zag tube core, sheet case

Gasoline Motor Trucks for 1919—Continued

ENGINE						TRANSMISSION										BRAKES		CONTROL			UNIVERSALS		
SPEED		FUEL SYS.		CLUTCH		GEARSET				FINAL DRIVE								STEERING GEAR					
Motor in R.p.m.	Truck in M.p.h.	Carbureter, Make	Fuel Feed	Type	Make	Type	Make	Placed	Speeds	Type	Axle Make	Total Gear Reduction	Propulsion Taken By	Torque Taken By	Springs, Make	Foot	Hand	Placed	Make	Levers	Type	Make	Name and Model
1,215	14	Stmbg..	vacm..	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Timkn.	10.3	r-rd...	spgs...	Mthr...	int-r-w.	int-r-w.	r....	Gem..	c....	metl...	Spicer.	Velie.....26A
...	35	Zenith..	grav..	cone..	own ...	selec...	own....	mtr...	3	bevl..	.....	5.25	spgs...	spgs...	.....	ext-r-w.	int-r-w.	l....	Jacox.	c....	metl..	Spicer.	Vim.....21
1,600	30	Zenith..	grav..	d-d...	.....	selec...	.....	mtr...	3	worm.	Shel...	6.5	spgs...	spgs...	.....	int-r-w.	int-r-w.	l....	Gem..	c....	metl..	Spicer.	Vim.....25
1,100	16	Zenith..	grav..	d-d...	.....	selec...	B-Lipe.	mtr...	4	worm.	Shel...	7.75	spgs...	spgs...	.....	int-r-w.	int-r-w.	l....	Gem..	c....	metl..	Spicer.	Vim.....22
1,000	14	Zenith..	grav..	d-d...	.....	selec...	B-Lipe.	amid..	4	worm.	Shel...	7.75	spgs...	spgs...	.....	int-r-w.	int-r-w.	l....	Gem..	c....	metl..	Spicer.	Vim.....23
1,000	12.5	Zenith..	grav..	cone..	own....	selec...	own....	amid..	4	ext-g..	own....	9.5	spgs...	spgs..	.....	ext-d-s.	ext-d-s.	l....	own...	c....	leat...	own...	Walter.....MO
1,000	15	H&N..	grav..	d-d...	Warner	selec...	own....	mtr...	4	in-g...	own....	8	spgs...	spgs.	Merl..	ext-f-w.	ext-f-w.	l....	own...	c....	metl..	own...	Walter.....F
1,100	11	Zenith..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	4	worm.	Timkn.	10.3	r-rd...	spgs	Shel...	int-r-w.	int-r-w.	r....	Gem..	c....	metl..	Spicer.	Watson...5-ton Tractor
.....	14	Zenith..	grav..	d-d...	Fuller..	selec...	own....	.....	8	worm.	Timkn.	.....	.....	.....	Tut...	d-s....	r-w....	r....	Ross.	c....	metl..	own...	Weir-Smith.....
.....	.....	own...	grav..	w-p...	own....	selec...	own....	amid..	4	bevl..	own....	.....	r-rd...	spgs...	.....	int-r-w.	ext-r-w.	l....	own..	c&l.	.....	.....	White.....GBBE
.....	.....	own...	grav..	w-p...	own....	selec...	own....	amid..	4	d-rd...	own....	.....	r-rd...	spgs...	.....	int-r-w.	ext-r-w.	l....	own..	c&l.	.....	.....	White.....TBC
.....	.....	own...	vacm..	w-p...	.....	selec...	own....	mtr...	4	d-rd...	own....	.....	r-rd...	spgs...	.....	ext-d-s.	int-r-w.	l....	.....	c....	.....	.....	White.....
.....	.....	own...	vacm..	w-p...	.....	selec...	own....	mtr...	4	d-rd...	own....	.....	r-rd...	spgs...	.....	ext-d-s.	int-r-w.	l....	.....	c....	.....	.....	White.....
1,200	18	Stmbg..	vacm..	d-d...	Fuller..	prog...	Fuller..	mtr...	3	worm.	Timkn.	.....	spgs...	spgs...	Shel...	int-r-w.	int-r-w.	l....	Ross.	c....	metl..	Arvac.	White-Hickory.....H
1,050	15	Stmbg..	grav..	cone..	own....	prog...	Cover..	amid..	3	chn...	Shel...	7.32	r-rd...	sub-f...	Dtrt...	int-r-w.	int-r-w.	r....	Ross.	l....	fab....	own...	Wichita.....A
1,210	15	Stmbg..	grav..	cone..	own....	prog...	Cover..	amid..	3	worm.	Shel...	7.8	spgs...	spgs...	Dtrt...	int-r-w.	int-r-w.	r....	Ross.	l....	fab....	own...	Wichita.....K
1,330	15	Stmbg..	grav..	cone..	own....	prog...	Cover..	amid..	3	worm.	Shel...	10.66	spgs...	spgs...	Dtrt...	int-r-w.	int-r-w.	r....	Ross.	l....	fab....	own...	Wichita.....L
1,060	15	Stmbg..	grav..	cone..	own....	prog...	Cover..	amid..	3	chn...	Shel...	8.24	r-rd...	sub-f...	Dtrt...	int-r-w.	int-r-w.	r....	Ross.	l....	fab....	own...	Wichita.....B
1,250	13	Stmbg..	grav..	cone..	own....	prog...	B-Lipe.	amid..	4	worm.	Shel...	10.33	spgs...	spgs...	Dtrt...	int-r-w.	int-r-w.	r....	Ross.	l....	fab....	own...	Wichita.....R
1,200	11	Stmbg..	grav..	cone..	own....	prog...	B-Lipe.	amid..	4	worm.	Shel...	11.75	spgs...	spgs...	Dtrt...	int-r-w.	int-r-w.	r....	Ross.	l....	fab....	own...	Wichita.....O
1,020	9	Stmbg..	grav..	cone..	own....	prog...	B-Lipe.	amid..	4	worm.	Shel...	13	spgs...	spgs...	Dtrt...	int-r-w.	int-r-w.	r....	Ross.	l....	fab....	own...	Wichita.....Q
1,200	18	Stmbg..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm.	Shel...	6.5	spgs...	spgs...	Shel...	int-r-w.	int-r-w.	l....	own...	c....	metl..	Spicer.	Wilcox.....S
1,100	14	Stmbg..	grav..	cone..	own....	selec...	own....	amid..	4	worm.	Shel...	8.75	spgs...	spgs...	Shel...	int-r-w.	int-r-w.	l....	own...	c....	fab....	own...	Wilcox.....X
1,100	14	Stmbg..	grav..	cone..	own....	selec...	own....	amid..	4	worm.	Shel...	8.75	spgs...	spgs...	Shel...	int-r-w.	int-r-w.	l....	own...	c....	fab....	own...	Wilcox.....Q
1,100	10	Stmbg..	grav..	cone..	own....	selec...	own....	amid..	3	worm.	Shel...	11.7	spgs...	spgs...	Shel...	int-r-w.	int-r-w.	l....	own...	c....	metl..	own...	Wilcox.....P
1,000	13.6	Stmbg..	grav..	cone..	own....	selec...	own....	amid..	4	worm.	Shel...	8.75	spgs...	spgs...	Shel...	int-r-w.	int-r-w.	l....	own...	c....	metl..	Spicer.	Wilcox.....W
1,150	25	Stmbg..	grav..	d-d...	own....	selec...	own....	mtr...	3	worm.	.....	6	spgs...	spgs...	own...	ext-r-w	int-r-w	l....	own...	c....	metl..	own...	Wilson.....
1,150	15	Stmbg..	grav..	cone..	own....	selec...	own....	amid..	3	worm.	.....	8.75	spgs...	spgs...	own...	int-r-w	int-r-w	l....	own...	c....	metl..	own...	Wilson.....
1,150	14	Marvl*.	grav..	d-d...	own....	selec...	own....	amid..	4	worm.	.....	8.75	spgs...	spgs...	own...	int-r-w	int-r-w	l....	own...	c....	metl..	own...	Wilson.....
1,200	20	Mast...	grav..	d-p...	B-Beck.	selec...	B-Lipe.	mtr...	3	in-g...	Clark..	7	spgs...	spgs...	Mthr...	ext-r-w	ext-d-s.	l....	Ross.	c....	metl..	own...	Winther.....3B
1,200	18	Mast...	vacm..	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	in-g...	Clark..	7	spgs...	spgs...	Mthr...	ext-r-w	int-r-w.	r....	Ross.	l....	metl..	Blood..	Winther.....4B
1,100	14	Mast...	vacm..	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	in-g...	Clark..	9	spgs...	spgs...	Mthr...	ext-r-w	int-r-w.	r....	Ross.	l....	metl..	Blood..	Winther.....6B
1,000	12	Mast...	vacm..	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	in-g...	Clark..	11	spgs...	spgs...	Mthr...	int-r-w.	int-r-w.	r....	Ross.	l....	metl..	Blood..	Winther.....8B
1,000	11	Mast...	vacm..	d-p...	B-Beck.	selec...	B-Lipe.	mtr...	4	in-g...	Clark..	11	spgs...	spgs...	Mthr...	int-r-w.	int-r-w.	r....	Ross.	l....	metl..	Blood..	Winther.....10B
950	10	Mast...	vacm..	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	in-g...	Clark..	11	spgs...	spgs...	Mthr...	int-r-w.	int-r-w.	r....	Ross.	l....	metl..	Blood..	Winther.....12B
900	10	Mast...	vacm..	d-p...	B-Beck.	selec...	B-Lipe.	amid..	4	in-g...	Clark..	11	spgs...	spgs...	Mthr...	int-r-w.	int-r-w.	r....	Ross.	l....	metl..	Blood..	Winther.....14B
1,000	16	Mast...	grav..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	worm.	Shel...	6.5	spgs...	spgs...	Shel...	int-r-w.	int-r-w.	l....	Lavn..	c....	metl..	Blood..	Wisconsin.....B
1,000	15	Mast...	grav..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	worm.	Shel...	7.7	spgs...	spgs...	Shel...	int-r-w.	int-r-w.	l....	Lavn..	c....	metl..	Blood..	Wisconsin.....C
.....	.....	Zenith..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm.	Timkn.	3.	spgs...	spgs...	.....	int-r-w.	int-r-w.	l....	Ross.	c....	metl..	Spicer.	Witt-Will.....D-16
1,000	14	Zenith..	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	3	worm.	Timkn.	7.7	spgs...	spgs...	Shel...	int-r-w.	int...	l....	Ross.	c....	metl..	Spicer.	Witt-Will.....WD-18
1,350	15	Flech..	grav..	d-d...	Fuller..	selec...	Fuller..	mtr...	3	in-g...	Russl..	7.7	spgs...	spgs...	Tut...	ext-r-w	int-r-w.	l....	Gem..	c....	metl..	Univ..	Wolverine.....C

Received Too Late to Classify

1,200	18	Mast...	vacm..	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Shel...	6.5	spgs...	spgs...	.....	int-r-w.	int-r-w.	l....	Lavn..	c....	.....	.....	Kimball.....2A
1,100	15	Mast...	vacm..	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Shel...	7.7	spgs...	spgs...	.....	int-r-w.	int-r-w.	l....	Lavn..	c....	.....	.....	Kimball.....6A
1,200	17	Mast...	vacm..	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Shel...	7.7	spgs...	spgs...	.....	int-r-w.	int-r-w.	l....	Lavn..	c....	.....	.....	Kimball.....4A
1,200	14	Mast...	vacm..	d-d...	B-Lipe.	selec...	B-Lipe.	amid.	4	worm.	Shel...	8.7	spgs...	spgs...	.....	int-r-w.	int-r-w.	l....	Lavn..	c....	.....	.....	Kimball.....8A
1,200	10	Mast...	vacm..	d-d...	B-Lipe.	selec...	B-Lipe.	amid..	4	worm.	Shel...	8.7	spgs...	spgs...	.....	int-r-w.	int-r-w.	l....	Lavn..	c....	.....	.....	Kimball.....10A
1,275	.....	Stmbg*	grav..	d-d...	B-Lipe.	selec...	B-Lipe.	mtr...	4	chn...	.....	10.5	r-rd...	tor-a...	Mthr...	ext-d-s.	int-r-w.	l....	Gem..	c....	.....	.....	Mack Tractor.....AB
1,250	18	Stmbg..	vacm..	d-d...	.....	selec...	.....	amid..	3	in-g...	.....	.....	spgs...	spgs...	.....	.....	.....	l....	.....	c....	.....	.....	Patriot.....
1,250	16	Stmbg..	vacm..	d-d...	.....	selec...	.....	amid..	4	worm.	.....	.....	spgs...	spgs...	.....	.....	.....	l....	.....	c....	.....	.....	Patriot.....
.....	.....	.....	.....	.....	.....	.....	Munc*.	.....	.....	worm.	Chgo..	.....	.. ..	.....	.....	.....	.....	.....	.....	.....	.....	.....	Texan.....

Steam Vehicles

SYSTEM		ENGINE							TRANSMISSION					CONTROL					
Feed Pump Type	Feed Control	Location	No. of Cylinders	Cylinders Cast	Valve Location	Valve Action	Valve Stroke	Reverses By	Final Drive	Gear-Ratio	Axle Type	Propulsion Taken By	Torque Taken By	Throttle	Hook-up	Reverse	Steering Wheel Location	Brake Lever Location	Name and Model
pump...	ther....	.....	4	block....	cyl-ends...	Stokesbary...	variable.	lever.....	int-g....	4.50-1	.....	springs....	springs..	lever...	lever....	lever...	left....	center...	Steam...

ABBREVIATIONS—Makers of Parts

*Other Options
A-K—Atwater-Kent
Al-Ch—Allis-Chalmers
Aut-L—Auto-Lite
B-Beck—Borg & Beck
B-Lipe—Brown-Lipe
Blng—Berling
Brem—Bremer
Can—Candler
Cant—Canton-Cleveland
CAS—C.A.S. Products Co.
Champ—Champion Spng.
Chgo—Chicago-Stndrd
Chgo—Chicago Mfg. Co.
Con—Continental
Conn—Connecticut
Cover—Covert
Del—Delany
Ditw—Ditweiler
Dneto—Dyneto
Dtrt—Detroit Press. Stl.
Dtrt—Detroit Lubricat.
Dtrt—Detroit G. & M. Co.
Dtrt—Detroit Stl. Spng.
Duplx—Duplex
E&M—English & Mersick
Eismn—Eisemann
Emp—Empire
Ens—Ensign
Eur—Eureka
Fed—Fedders
Flech—Fletcher
Fost—Foster
Franck—Francke
G&D—Gray & Davis
G&O—G. & O. Mfg. Co.
GBS—Golden, Belknap & Swartz
G-Lees—Grant-Lees
Gem—Gemmer
H&N—H. & N. Carburetor Co.
Har—Harrison
Hart—Hartford
Hays—Hayes
Her—Hercules
Hig—Higgins
Hol—Holley
H-Shaw—Hele-Shaw
H-S—Herschell-Spillman
Hyd—Hydraulic
Idl—Ideal
Ind—Industrial Equipment Co.
Iron—Iron City
J-A—Jackson Radiator Wks
Jacox—Jackson-Church-Wilcox
Jas—Jamestown Car Pts. Co.
Jhnson—Johnson
Kal—Kalamazoo
K-B—Kinsler-Bennett
Key-H—Keystone-Hindley
King—Kingston
Koko—Kokomo
Lau—Lauraine
Lavn—Lavine
LeR—LeRoi
Lgt—Light Foundry
Ligt—Liggett
L-N—Leece-Neville
Lyc—Lycoming
Marvl—Marvel
Mast—Master
McC—McCord
McFar—McFarland
Mech—Mechanics
Merl—Merrill
Mil—Milwaukee
Mnrch—Monarch
Mod—Modine
Mthr—Mather
M&E—Merchant & Evans
Natl—National
N.A.—North American
N-E—North East
Nlite—Nicolite
Penn—Penn Spring Co.
P&B—Parish & Bingham
Per—Perfex
Perf—Perfection
Prsh—Parish
R-T—Rome-Turney
Rayfld—Rayfield
Rem—Remy
Rowl—Wm. Harvel Rowland
Rugles—Ruggles
Russl—Russel
Rut—Rutenber
Savg—Savage Arms
Salsby—Salisbury
Schblr—Schebler
Shel—Sheldon
Shkspr—Shakespeare
Smth—A. O. Smith
S-P—Spring-Perch
Spltf—Splitdorf
Stan—Standard Radiator Co.
Stand—Standard Steel Spring Co.
Stewrt—Stewart
Stlg—Sterling
Stmbg—Stromberg
Sundmn—Sunderman
S-W—Sparks-Withington
Therm—Thermoid
Timkn—Timken
Tltsn—Tillotson
Torbn—Torbenson
Tut—Tuthill
Univ—Universal Machine Co.
Wau—Waukesha
West—Westinghouse
Wis—Wisconsin
Wol—Wohlrab
W-W—Walker-Weiss

Truck Production for 1918 Is 250,000

A Gain of 32 Per Cent Over 1917—Indications That 1919 Will Be Record Year—Great Highway Developments Indicated—The Truck's Future and Load Capacity Trend

DESPITE abnormal manufacturing and selling conditions which affected every industry in the country to a greater or lesser degree during the past year, and which were particularly detrimental to the development of the automotive industry (except in its capacity for handling successfully the enormous tasks set it by the Government), 1918 will go down in history as a record breaker on gasoline truck production.

It is true that the restrictions placed upon the activities of the truck builder in all directions other than the filling of the country's military requirements resulted in failure to reach the estimated output of 310,000 trucks for the year, but, nevertheless, all former annual production figures were eclipsed in 1918.

Excluding attachments designed to convert passenger cars into trucks (so-called), 250,000 trucks of all kinds were built during the past year, as compared with a total of 190,000 in 1917. Thus it is that although the scheduled goal was not reached by 60,000, the 1917 figure was exceeded by precisely a similar figure, a gain of 32 per cent.

Unwarranted Restrictions

It is a curious commentary on the frame of mind of our wartime legislators that although the War Industries Board went on record early in 1918 with the statement that it considered trucks "to be an important means of transportation, the use of which was not to be curtailed," this branch of the industry suffered continually from adverse priority orders curtailing the supply of essential material and thereby experienced much delay and loss. The Highways Transport Committee and other Government departments repeatedly expressed their opinion that the widest possible use of trucks should be encouraged by every possible means, but nevertheless the officially dictated handicap continued to be imposed for an appreciable time. Yet 1918 was a record truck year.

It is not possible to prophesy with any degree of accuracy the truck production for 1919, but it is safe to place the minimum around 290,000. It is true that all official restrictions have been removed, but the reorganizing of factories on a peace basis, the inevitable redistribution of labor and the possibility of having to meet overseas necessities for steel and other metals to be used for reconstruction work in devastated districts have caused a temporary feeling of uncertainty as to when normal production can be resumed throughout the country. Under favorable circumstances it is quite conceivable that this minimum production figure will be substantially exceeded before the year closes.

The one hundred per cent plus service rendered by the truck in war has done much to enable the potential commercial user to visualize through a wider angle lens the vast possibilities the truck affords in peace, and there is no question that the demand waits but to be filled as soon as our truck factories have passed through the reconstruction period and are operating on a normal production schedule.

Where the 1918 Trucks Are Operating

Of the 250,000 trucks built in 1918, present figures indicate that 137,000 have gone into commercial service in the U. S., as compared with the domestic consumption of 153,000 during 1917. Thus, assuming the 1918 demand was the same as that of 1917, there was an apparent shortage of 16,000 trucks. In other words, there should be an excess demand for 16,000 trucks over and above whatever may prove the normal demand in 1919.

Of the balance of our 1918 production, approximately 12,000 trucks were exported, irrespective of the 102,000 delivered to the Government for military service either overseas or at home. Of the 1918 production, assuming that all trucks on order were completed by December 31, 1918, approximately 41 per cent went into military work.

The Status of the Military Truck

A matter of vital importance to both the truck maker and the truck user is how the problem of the existing military trucks will be solved. The manufacturer naturally views the situation from the angle of how the sale of such trucks is likely to affect his business, and the user thinks he sees the possibility of securing serviceable used trucks at a cut-rate price.

Common sense and a slight knowledge of conditions overseas indicate that a belief that all trucks now with the American Expeditionary Forces will remain there until worn out is fully justified. Approximately 47,000 trucks were shipped abroad for military service, and it is fairly evident that all of these will be needed to maintain our army of occupation. Afterwards it seems highly probable that any of the trucks yet capable of giving adequate service will be absorbed by the industrial army of rehabilitation which must follow on the heels of our fighting forces. Therefore the problem, so far as these overseas trucks are concerned, may be considered as solved.

It is with regard to the forty-odd thousand Government trucks which are in this country that the position demands a measure of consideration, ignoring any balance of uncompleted orders which have not been cancelled. Assuming that the Government turns over 20,000, or perhaps 25,000, trucks to the Post Office Department, there still remains a large number to be disposed of.

It is too soon to speculate on the manner in which the problem of distributing this truck surplus can be solved without reacting to the detriment of trade. It is possible that nothing can be done until the peace treaty is actually signed, as this undoubtedly will have considerable bearing on the ultimate disposition of the vehicles. For example, the size of our overseas army of occupation and the possible necessity for maintaining a relatively large force on police duty abroad may in itself give the answer. It is understood that several of the allied governments are anxious to purchase any trucks not needed by our War Department, and this, again, may clear up the situation to the satisfaction of those most concerned.

The suggestion has been made that any remaining surplus of Government trucks should be employed in the reclamation of Western waste lands and in the construction of a national system of highways, instead of being placed on the market at cut prices.

The subject is one of real importance to the trade, and for this reason it is expected that full consideration will be given it by all parties in the course of our various schemes for the return of business generally to a peace footing with a minimum of hardship imposed on any branch of the nation's industry.

1919—A Year of Road Development

Railroad congestion and inability to handle the abnormal freight movement demanded by wartime conditions gave the truck the chance to prove itself. It has done so to the full. Given reasonably good highways, the railroad short and middle-distance hauls are things of the past. Trucks, when operated with a reasonable degree of intelligence, have shown

IDE GUIDE AND GRIPPER

they can do the work with greater efficiency, much greater speed and at lower cost.

Trucks have invaded the cotton fields of the South and the lumber camps of the North; they have shown what they can do in the grain-raising districts of the Middle West, and they have proved their worth to the farmer who must reach the market town with his perishable products in a minimum of time. The Post Office has demonstrated that its fleet of trucks is earning four times its cost, and is planning to operate 2000 more on 600 new routes in the immediate future.

Admittedly the truck has shown conclusively what it can do —it remains to provide a highway system which will furnish the opportunity for unlimited truck-mileage irrespective of weather conditions. The wear and tear on highways has been greater than ever during the past year, but owing to the impossibility of obtaining materials less than one-half of the money available for construction and maintenance was expended. Thus, our roads are now, speaking generally, in a pretty bad state.

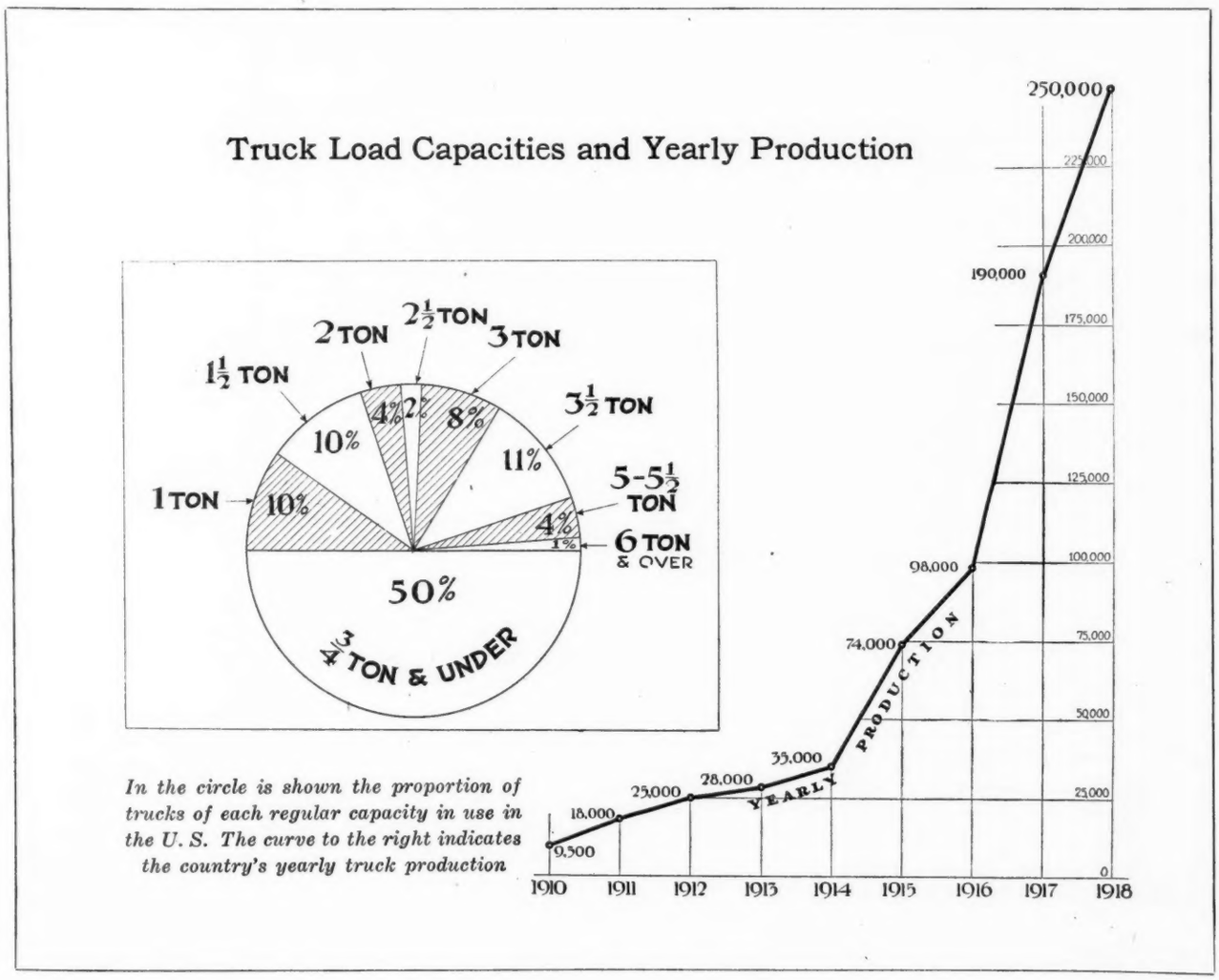
Federal Highways Commission Is Probability

To remedy the existing state of things and to add considerably to the country's road mileage, it is probable that 1919 will see the creation of a Federal Highway Commission and a system of national highways, laid out, built and maintained by the Government as through trunk lines for commercial as well as military purposes. Good roads will enable the truck user to reach points which are now commercially inaccesible—good roads mean more, and yet more, trucks.

Since the truck has proved its position as an essential to the successful conduct of war overseas and has, in addition, been tried out under extreme conditions in time of national commercial stress at home—where it has fulfilled its mission with all credit—there can be no question as to its assured future. The only possible doubt is as to whether *any* limit can be set on its all round usefulness in doing its part in keeping the wheels of industry turning, or whether its future is, to all practical intents and purposes, limitless. There is no doubt but that in the almost immediate past we have had but little conception as to the value and efficiency of the truck. We know better now, but it is a question if we still realize the vast possibilities it holds in the development of highway transport.

In this connection it is of interest to note the changes that are taking place in the matter of truck load capacities. These are referred to in detail elsewhere in this issue of AUTOMOTIVE INDUSTRIES. A recent compilation of the capacities of all the trucks in use in the country indicates that 50 per cent are of ¾-tons and under, 1 and 1½-ton trucks are each 10 per cent of the total, 4 per cent are 2-tonners, 2 per cent are of 2-ton capacity, 3-tonners represent 4 per cent, 3½-tonners are 11 per cent, 5 and 5½-tonners are 4 per cent and the remaining 1 per cent covers 6-ton trucks and over.

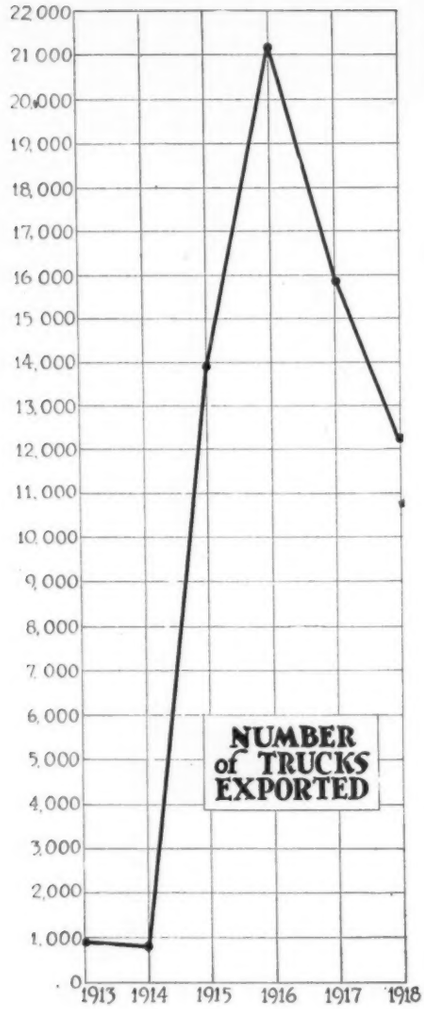
A summing up of the future of the truck needs but few words. Services already rendered show beyond the shadow of a doubt that the truck is not only capable of furnishing adequate service, but that it is an essential to transportation. Relatively, it is only in its infancy as a means of country-wide transport, and the day is not far distant when our truck trains will run on schedule both as connecting links between railroad systems and as independent carriers of high-speed, heavy-duty and low-cost type.



In the circle is shown the proportion of trucks of each regular capacity in use in the U. S. The curve to the right indicates the country's yearly truck production

Nearly 22 Per Cent of Trucks

Exports Have Dropped During the Past Two Cultivation on



A CASUAL glance at the charts giving numbers and value of our exports of commercial vehicles for the past six years is amply sufficient to show that the truck manufacturers of the United States touched the peak of overseas trade at the period when the world-war and its demands on the manufacturing resources of England, France and Italy had caused the mobilization of every factory and machine shop in those countries on a munition-making basis.

It is true that a number of these factories continued to build trucks, but as the entire production was absorbed by the several governments for strictly military duties, the commercial needs of the various communities were ignored. As the railroads were fully occupied in war work, transportation in these countries would have been at a standstill were it

TRUCKS PRODUCED AND EXPORTED

Year	Number Produced	Number Exported	Percentage Exported
1913....	28,000	993	3.54
1914....	35,000	784	2.24
1915....	74,000	13,996	18.91
1916....	98,000	21,265	21.90
1917....	190,000	15,997	8.92
1918....	250,000	12,200	4.88

Note—The figures in italics show the number of trucks.

EXPORTS OF COMMERCIAL VEHICLES FOR SIX YEARS

Prior to 1913, *commercial vehicle statistics were included under the general heading Automobiles*

	1913	1914	1915	1916	1917	1918	Totals by Countries
Europe:							
Austria-Hungary	*2* $3,595	*3* $7,455	....	....	....	....	*5* $11,050
Azores and Madeira Islands	....	....	....	....	....	....	....
Belgium	....	....	*100* $365,000	....	....	....	*100* $365,000
Bulgaria	*2* $1,528	....	....	....	....	....	*2* $1,528
Denmark	*3* $2,120	....	*44* $25,033	*41* $36,413	*58* $81,414	*2* $3,800	*148* $189,786
Finland	....	....	....	....	....	....	....
France	*6* $10,709	*2* $5,070	*4,990* $13,523,843	*5,681* $17,709,579	*4,264* $13,854,903	*2,754* $10,001,636	*17,697* $55,105,740
Germany	*4* $4,029	*24* $18,462	*4* $2,800	....	....	....	*32* $25,291
Gibraltar	....	....	....	....	....	*27* $58,325	*27* $58,325
Greece	*1* $1,176	*1* $1,800	*142* $426,570	*45* $98,815	*3* $2,000	*14* $32,000	*206* $561,361
Iceland and Faroe Islands	....	....	....	....	....	*1* $2,245	*1* $2,245
Italy	....	*1* $1,229	*1* $8,000	*6* $14,655	*65* $159,775	*52* $28,055	*124* $211,714
Netherlands	*2* $4,489	*1* $1,452	*9* $19,069	*50* $93,797	*36* $55,305	....	*98* $174,112
Norway	*2* $2,200	*2* $3,852	*3* $4,689	*81* $121,480	*162* $266,741	*40* $133,227	*290* $532,189
Portugal	*1* $1,400	*8* $12,075	*5* $10,291	*295* $1,117,681	*21* $45,087	*12* $36,914	*342* $1,223,448
Roumania	*12* $12,000	....	....	....	....	....	*12* 12,000
Russia in Europe	*13* $34,163	*2* $5,322	*2,251* $7,666,883	*3,909* $12,544,258	*1,733* $5,428,979	*406* $1,562,303	*8,314* $27,241,908
Serbia, Montenegro & Albania	....	....	*10* $6,300	*20* $65,000	....	....	*30* $71,300
Spain	*1* $1,400	....	*1* $1,800	*30* $57,277	*29* $55,808	*46* $97,910	*107* $214,195
Sweden	....	*1* $900	*10* $17,600	*19* $29,050	*6* $10,879	*7* $10,360	*43* $68,789
Turkey in Europe	....	*1* $2,000	*2* $8,009	....	....	....	*3* $10,009
England	*184* $119,468	*203* $189,099	*5,306* $14,042,325	*8,268* $18,723,403	*6,525* $17,061,105	*4,805* $13,438,981	*25,291* $63,574,381
Scotland	....	....	*4* $11,250	*224* $271,745	....	*447* $1,203,328	*675* $1,386,323
Ireland	....	....	*1* $7,033	*8* $39,776	....	....	*9* $46,809
North America:							
British Honduras	....	....	....	....	....	*2* $3,700	*2* $3,700
Canada	*489* $1,004,237	*247* $474,724	*306* $705,213	*387* $724,817	*636* $945,047	*1,108* $1,381,542	*3,173* $5,235,580
Central American States:							
Costa Rica	*2* $3,643	*8* $10,571	*2* $4,165	....	*1* $900	*5* $10,245	*18* $29,524
Guatemala	....	....	....	*2* $4,916	*4* $4,323	*3* $5,512	*9* $14,651
Honduras	*1* $3,000	....	*6* $12,500	*6* $14,540	*4* $4,094	*6* $3,373	*23* $37,507
Nicaragua	....	....	....	*1* $2,500	....	*1* $2,509	*1* $2,509
Panama	....	*5* $7,243	*6* $12,010	*32* $55,171	*75* $97,970	*47* $47,859	*165* $220,253
Salvador	....	....	....	*1* $1,300	*1* $868	*4* $14,811	*6* $16,979
Mexico	*35* $83,363	*12* $17,509	*8* $14,492	*51* $100,500	*218* $198,151	*365* $525,664	*689* $939,679
Newfoundland and Labrador	*4* $8,845	*1* $1,221	*1* $750	*1* $1,692	*1* $2,675	*2* $7,250	*10* $22,433
West Indies, British:							
Barbados	....	....	....	....	*1* $1,506	*2* $3,400	*3* $4,906
Jamaica	*4* $9,234	*3* $9,250	*3* $7,292	*9* $18,524	*6* $8,285	*10* $6,775	*35* $59,360
Trinidad and Tobago	....	*1* $2,000	....	*2* $1,974	*2* $5,722	*14* $18,361	*19* $28,057
Other British	....	....	....	*6* $11,327	*1* $500	*28* $89,914	*35* $101,741
Cuba	*14* $23,639	*19* $33,500	*21* $34,607	*117* $176,647	*397* $722,519	*554* $1,130,982	*1,122* $2,121,894
Danish (Virgin Is. of U.S.)	*1* $4,250	....	....	....	....	*2* $2,845	*3* $7,095
Dominican Republic	*1* $1,858	*1* $1,800	*2* $3,372	*4* $5,173	*22* $23,640	*21* $13,323	*51* $49,166
Dutch	....	*1* $595	*1* $1,463	....	*2* $2,095	....	*4* $4,153
French	....	....	*2* $3,975	*1* $2,310	*7* $13,305	*26* $49,626	*36* $69,216

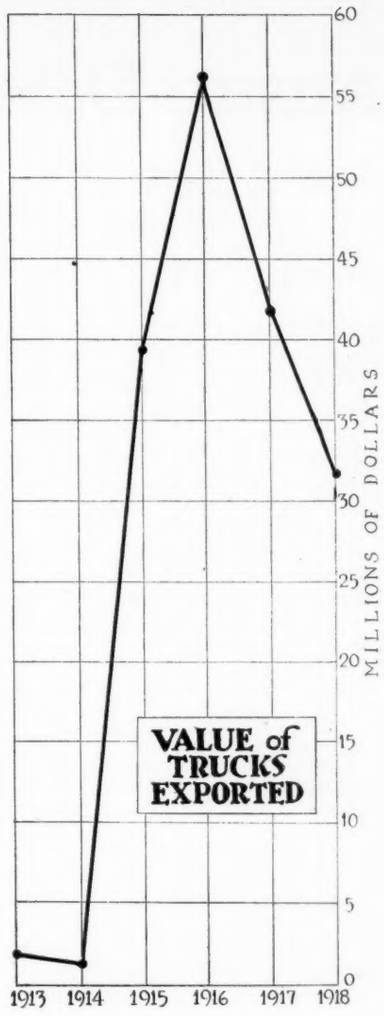
Produced in 1916 Sold Abroad

Years—The Field Is Still There and Needs Intensive Lines

EXPORTS OF COMMERCIAL VEHICLES FOR SIX YEARS

Prior to 1913, *commercial vehicle statistics were included under the general heading Automobiles*

	1913	1914	1915	1916	1917	1918	Totals by Countries
	3	....	....	....	*2*	*11*	*16*
Haiti	$5,553	....	....	....	$1,324	$10,578	$17,155
South America:							
	35	*48*	*3*	*45*	*141*	*51*	*323*
Argentina	$78,000	$65,225	$2,910	$33,063	$146,255	$50,124	$375,577
	....	....	....	....	*20*	*14*	*34*
Bolivia	....	....	....	....	$48,590	$24,958	$73,548
	36	*13*	*3*	*11*	*14*	*24*	*101*
Brazil	$75,073	$20,449	$2,861	$19,635	$8,300	$31,133	$157,451
	....	*2*	....	*17*	*69*	*220*	*308*
Chile	....	$10,743	....	$46,566	$160,696	$282,638	$500,643
	3	....	*1*	*4*	*2*	*3*	*13*
Colombia	$6,112	....	$1,237	$1,236	$4,998	$7,100	$20,683
	1	....	....	*2*	*1*	*3*	*7*
Ecuador	$2,017	....	....	$3,378	$2,050	$6,876	$14,321
	....	....	*1*	....	*1*	*7*	*9*
Guiana, British	....	....	$900	....	$1,529	$5,100	$7,529
	....	....	....	*1*	....	....	*1*
Dutch	....	....	....	$1,037	....	....	$1,037
	....	*3*	*2*	*5*	*25*	*73*	*108*
Peru	....	$5,301	$3,484	$5,830	$48,776	$155,834	$218,225
	7	*1*	....	*2*	*4*	*16*	*30*
Uruguay	$19,280	$865	....	$5,818	$10,437	$15,809	$52,209
	23	*12*	*3*	*6*	*14*	*16*	*74*
Venezuela	$34,291	$28,228	$7,164	$13,029	$28,502	$12,410	$123,624
Asia:							
	....	*7*	....	*39*	*9*	*23*	*78*
China	....	$12,700	....	$9,799	$14,287	$26,236	$63,022
	....	....	*1*	....	....	....	*1*
China, French	....	....	$2,451	....	....	....	$2,451
	1	....	....	*3*	....	*2*	*6*
Chosen (Korea)	$3,500	....	....	$5,027	....	$1,629	$10,156
East Indies, British:							
	....	*7*	*7*	*135*	*126*	*11*	*286*
British India	....	$12,091	$8,680	$208,067	$205,023	$20,275	$454,136
	2	*7*	....	*17*	*57*	*70*	*153*
Straits Settlements	$5,588	$14,381	....	$25,169	$61,881	$113,554	$220,573
	....	....	*1*	*20*	*26*	*3*	*50*
Other British	....	....	$3,300	$27,841	$38,970	$7,138	$77,249
	2	*7*	*11*	*58*	*108*	*68*	*254*
Dutch	$4,840	$14,232	$9,567	$82,586	$137,609	$162,749	$411,583
	....	....	....	....	....	*2*	*2*
French	....	....	....	....	....	$3,500	$3,500
	....	....	*1*	*3*	....	*8*	*12*
Hongkong	....	....	$4,780	$6,304	....	$5,371	$12,455
	21	*1*	*1*	*15*	*70*	*279*	*387*
Japan	$32,770	$900	$3,382	$14,528	$59,198	$317,787	$428,565
	....	....	....	....	....	*4*	*4*
Persia	....	....	....	....	....	$2,712	$2,712
	....	....	*596*	*1,170*	*515*	....	*2,281*
Russia in Asia	....	....	$1,903,221	$3,546,435	$1,662,144	....	$7,111,800
	....	....	....	*9*	*8*	*6*	*23*
Siam	....	....	....	$7,036	$6,700	$4,535	$18,271
	....	*1*	*5*	....	*2*	....	*8*
Turkey in Asia	....	$1,354	$26,282	....	$1,143	....	$28,779
Oceania, British:							
	17	*32*	*57*	*201*	*194*	*109*	*610*
Australia	$23,027	$37,378	$84,142	$295,538	$237,159	$163,405	$840,649
	1	*39*	*20*	*93*	*75*	*74*	*302*
New Zealand	$1,201	$61,599	$31,575	$149,848	$119,833	$145,764	$509,820
	....	....	....	....	*1*	*2*	*5*
Other British	....	....	....	$2,612	$1,688	$2,404	$6,702
	2	*4*	....	*1*	*2*	*5*	*14*
French	$3,400	$7,625	....	$860	$2,750	$6,480	$21,115
	....	....	....	*1*	*3*	*4*	*8*
German	....	....	....	$1,530	$2,377	$5,518	$9,425
	43	*38*	*27*	*53*	*53*	*163*	*382*
Philippine Islands	$91,809	$64,805	$62,132	$88,286	$57,457	$215,106	$579,613
British Africa:							
	....	*1*	....	*7*	*115*	*27*	*150*
West	....	$1,260	....	$13,173	$124,574	$20,136	$159,143
	11	*12*	*15*	*36*	*54*	*70*	*178*
South	$9,476	$11,539	$40,280	$54,519	$82,957	$107,085	$305,856
	....	....	....	....	....	*1*	*1*
East	....	....	....	....	....	$787	$787
	....	*1*	....	....	*1*	....	*2*
Canary Islands	....	$1,203	....	....	$575	....	$1,778
	....	....	....	....	*4*	....	*4*
Egypt	....	....	....	....	$9,624	....	$9,624
	1	....	....	....	....	*18*	*19*
French Africa	$858	....	....	....	....	$12,963	$13,821
	....	....	....	*7*	....	....	*7*
Morocco	....	....	....	$9,675	....	....	$9,675
	....	*1*	....	*1*	*1*	....	*3*
Portuguese Africa	....	$2,604	....	$2,803	$2,500	....	$7,907
GRAND TOTAL:							
Number	*993*	*784*	*13,996*	*21,265*	*15,977*	*12,200*	*65,215*
Value	$1,737,141	$1,181,611	$39,140,682	$56,805,548	$42,343,502	$31,874,459	$173,082,945



not for the trucks imported from the U. S. A.

In the case of Russia, a country without truck factories and with an incomplete railroad organization, the commercial vehicles purchased from us were essential to keep commerce moving even in a sub-normal way. Canada's American-built trucks were also sorely needed to replace the overworked railroads. In Latin American republics we have done well in the absence of European competition.

Now that we have passed the relatively artificial export peak created by war-time conditions, as shown by the falling off in our truck exports, there remains the question of maintaining our sales to foreign customers in the face of the intensive competition we shall have to face from a reconstructed Europe. There is no doubt whatever but that this can be accomplished and that the close of 1919 will see a decided improvement in our truck exports over that of 1918.

Although a steady increase may be expected in the domestic demand for trucks, it may be that production is now practically at a point where the export field must be developed to its full.

Note—The figures in italics show the number of trucks.

Austro-Daimler 200-Hp. Aircraft Engine

Part III

Metallurgical Test Data—Mechanical Test Data—General Data —Analysis of Weights

THE chemical compositions and the relative material strengths of the principal parts of the engine are given in the following chemical analysis and mechanical test reports:

(1) *Chemical Analysis*

Per Cent:	C.	Si.	Mn.	S.	P.	Cr.	Ni.
Crankshaft	.14	.27	.43	.030	.006	1.34	3.45
Cylinder	.47	.19	.67	.037	.046	Nil.	Nil.
Connecting rod	.40	.16	.73	.043	.023	.36	1.50
Camshaft (case-hardened)	...	.21	.43	.035	.012	.57	3.15
Inlet valve	.46	.24	.42	.023	.022	.47	2.28
Exhaust valve	.44	.24	.41	.025	.022	.47	2.36
Valve rocker	.46	.09	.63	.051	.028	.42	1.57
Piston pin (case-hardened)	...	.12	.49	.028	.011	1.5	3.70

(2) *Chemical Analysis*

	Crankcase Per Cent	Piston Per Cent
Copper	2.79	7.67
Zinc	6.61	1.33
Tin	Nil.	2.21
Silicon	0.76	0.52
Iron	2.06	1.32
Manganese	0.02	Trace
Nickel	...	Nil.
Magnesium	...	0.29
Aluminum (by difference)	87.76	86.66

(3) *Bearings*

Per Cent	Journal Bearings	Big-End Bearings	Camshaft Bearings	Valve Rocker Bearings
Copper	6.70	5.10	87.51	96.29
Zinc	...	...	0.28	Trace
Tin	81.13	81.42	11.34	2.52
Lead	0.71	1.64	0.17	0.28
Antimony	12.00	12.00	...	...
Manganese	...	...	Nil.	0.21
Nickel	...	...	0.35	0.07
Iron	...	...	0.17	0.13
Phosphorus	...	...	0.05	...

(4) *Mechanical Tests*

	Mark	No.	Area sq. in.	Y.S. T sq. in.	M.S. T sq. in.	Elong: p.c. of	Red: Area	Impact ft. lbs.
Journal	A.	1.	.002	66.7	75.1	13.35	57.4	
Journal	B.	2.	...	...	...	...	...	30.5
Pin	C.	3,	.005	62.7	72.5	15.55	59.8	
Pin	D.	4.	...	...	...	...	...	33.5
Web, longitude.	E.	5.	.005	71.6	75.8	10.0	35.0	
Web, transverse.	H.	8.						(1) 5.0
Web	F.	6.	...	...	...	...	...	7.5
Web, transverse.	G.	7.	.005	72.9	74.5	7.78	25.1	
								(2) 7.0

General Data

Make of engine and rated hp	Austro-Daimler 200-hp.
No. of cylinders	Six
Type number	8597
Bore	135.0 mm. (5.31 in.)
Stroke	175.0 mm. (6.89 in.)
Stroke/bore ratio	1.29:1
Area of one piston	143.1 sq. cm. (22.2 sq. in.)
Total piston area of engine	858.6 sq. cm. (133.1 sq. in.)
Swept volume of one cylinder	2504.9 cu. cm. (152.8 cu. in.)
Total swept volume of engine	15029.7 cu. cm. (916.8 cu. in.)
Clearance volume of one cylinder	623.1 cu. cm. (38.0 cu. in.)
Compression ratio	5.02:1
Normal b.hp. and speed	200 b.hp. at 1400 r.p.m.
Maximum ditto	222 b.hp. at 1600 r.p.m.
Normal b.m.e.p	123.3 lb. per sq. in at 1400 r.p.m.
Maximum ditto	123.5 lb. per sq. in. at 1300 r.p.m.
Piston speed	1607 ft. per min.
Mechanical efficiency (calculated)	89.7 per cent
Indicated mean pressure (calculated)	137.5 lb. sq. in.
Fuel consumption per b.hp. hour.	0.555 pint = 0.499 lb.
Brake thermal efficiency	27.4 per cent
Indicated thermal efficiency	30.6 per cent
Air standard efficiency	47.5 per cent
Relative efficiency	64.4 per cent
Cu. in. of swept volume per b.hp.	4.58 cu. in.
Sq. in. of piston area per b.hp.	0.665 sq. in.
Hp. per cu. ft. of stroke volume	377.3 b.hp.
Hp. per sq. ft. of piston area	216.6 b.hp.
Direction of rotation of crankshaft	Anti-clockwise
Direction of rotation of airscrew.	Ditto
Type of gear reduction to airscrew	None
Ratio crankshaft speed/propeller speed	1:1
Type of valve gear	Overhead camshaft
Type of starting gear	Compression release

CARBURETERS

Number and type of carbureters.	One dual Austro-Daimler
Diameter of choke tube	24.0 mm. (0.945 in.)
Bore of main jets	35.0 c.c. through per min.
Bore of pilot jets	5.8 c.c. through per min.
Fuel consumption per hour	111.0 pints = 100.0 lb.
Fuel consumption per b.hp. hour.	0.555 pint = 0.499 lb.

GAS VELOCITIES, VALVE AREA, ETC.

Diameters

Induction pipe	59.0 mm. (2.32 in.)
Inlet and exhaust effective valve ports (each)	44.0 mm. (1.73 mm.)
Inlet and exhaust cylinder ports (each)	42.0 mm. (1.65 in.)

CROSS SECTIONAL AREAS

Induction pipe	27.33 sq. cm. (4.22 sq. in.)
Inlet valve (πdh) } each	13.69 sq. cm. (2.12 sq. in.)
Exhaust valve (πdh) } each	14.05 sq. cm. (2.18 sq. in.)
Exhaust branch pipes	38.25 sq. cm. (5.92 sq. in.)

MEAN GAS VELOCITIES (1400 r.p.m.)

Induction pipe	141.0 ft. per sec.
Inlet valves	140.0 ft. per sec.
Exhaust valves	136.0 ft. per sec.
Exhaust branch pipe	100.5 ft. per sec.

INLET VALVES

Number per cylinder	Two
Largest diameter	48.0 mm. (1.89 in.)

(*Continued on page* 134)

Record of Performances of British Airplanes

Type	Tractor or Pusher	No. of Seats	Engine	Normal B.H.P. and R.P.M. at G. L.	Lifting Surface	Speed in M.P.H. and R.P.M. @ 10,000 Ft.			Time in Mins. and Rate of Climb in Ft. per Minute and R.P.M. @ 10,000 Ft.						Service Ceiling, Ft.	Loading		Comparative Performance See Note		Weight, Lbs.					Dimensions		
									6500′		10,000′		15,000′					At 10,000′									
						At 6500	At 10,000	At 15,000	Time	Rate	Time	Rate and R.P.M.	Time	Rate		Lbs. per Sq. Ft.	Lbs. per H.P.	Speed	Climb	Gross =	Empty +	Fuel and Oil +	Mily. Load +	Crew	Span	Length	Height
																									′ ″	′ ″	′ ″
De Haviland 9[1]	T	2	200 B.H.P. Siddeley	240@1400	438	....	.....	102	9.7	550	17.1	405	34.2	200	17,500	7.6	14.0	.....	...	3351	2234	572	185	360	42 6	30 6	10 0
De Haviland 9[2]	T	2	200 B.H.P. Siddeley	240@1400	438	....	111.5 / 1505	101	10.1	520	17.9	1350 / 380	36.4	180	17,000	7.6	13.9	.....	...	3342	2225	572	185	360	42 6	30 6	10 0
De Haviland 9[3]	T	2	200 B.H.P. Siddeley	240@1400	438	....	.....	97.5	11.1	460	20.3	1350 / 315	46.7	110	15,000	8.1	14.9	105.4	366	3564	2225	572	407	360	42 6	30 6	10 0
De Haviland 9[4]	T	2	200 B.H.P. Siddeley	240@1400	438	....	107 / 1475	.....	11.7	430	21.7	1350 / 290	.....	.....	14,500	8.1	14.9	.....	...	3564	2225	572	407	360	42 6	30 6	10 0
S. E. 5	T	1	Viper Hispano.	202@1800	249	....	.....	117.5	6.7	810	11.6	1350 / 610	22.6	330	19,000	8.0	9.8	.....	...	1980	.....	.....	100	180	28 0	21 4	9 5
Bristol Fighter	T	2	200 Hispano S.	210@2000	405	....	105	97.5	8.7	620	15.1	1720 / 475	28.8	270	19,000	6.5	12.5	98.6	355	2630	1733	345	192	360	39 3	24 9	9 6
Blackburn Kangaroo	T	3	Twin Falcon Mk. 2	2x253@2000	868	98	1995 / 86	.....	18.2	250	38.2	1810 / 115	.....	.....	10,500	9.2	15.8	93.4	292	8017	5284	1730	463	540	74 10	42 6	16 0
Sopwith Hippo	T	2	225 Clerget	.....	....	....	1885/1895 / 115	93	7.4	655	13.4	1805/1805 / 470	28.6	195	17,000	...	....	.....	...	2590	.....	.....	363	360	.....	.....	...
De Haviland 9	T	2	260 Fiat	260@1400	438	....	1345 /	109	9.2	550	16.6	1230 / 405	32.7	240	20,000	8.2	13.9	.....	...	3600	.....	.....	185	360	42 6	30 6	10 0
Sopwith Dolphin[5]	T	1	200 Hispano S.	210@2000	258	....	127.5 / 1970	119	6.1	900	10.5	1420 / 705	19.5	425	21,000	7.4	9.1	97.8	296	1911	.....	.....	101	180	32 6	22 6	8 0
Sopwith Dolphin [6]	T	1	200 Hispano S.	210@2000	258	....	121.5 / 1915	114	7.1	775	12.1	1725 / 590	23.0	335	20,000	7.6	9.3	.....	...	1959	.....	.....	136	180	32 6	22 6	8 0
Sopwith Camel	T	1	150 Mono Gnome	154@1225	231	....	.....	.....	5.6	960	9.6	1725 / 755	17.9	470	22,000	6.2	9.4	.....	...	1441	930	230	101	180	28 2	18 6	8 6
De Haviland 4	T	2	Rolls Eagle 8	360@1800	438	....	130 / 1840	124	6.5	840	11.3	1175 / 660	20.9	400	21,000	8.2	9.9	.....	...	3576	2509	522	185	360	42 6	29 8	11 1
S. E. 5	T	1	Viper Hispano	202@1800	249	....	.....	120	6.3	870	10.8	1575 / 665	20.8	370	19,500	8.0	9.8	.....	...	1988	.....	.....	.....	180	28 0	21 4	9 5
Sopwith Dolphin	T	1	200 Hispano S.	210@2000	258	....	128 / 1945	119.5	6.4	855	11.0	1780 / 675	20.2	420	21,000	7.8	9.6	.....	...	2003	.....	.....	101	180	32 6	22 6	8 0
Sopwith Dolphin	T	1	200 Hispano S.	210@2000	258	....	.....	116.5	6.2	885	10.6	1690 / 685	19.9	405	21,000	7.7	9.5	.....	...	1990	.....	.....	101	180	32 6	22 6	8 0
Sopwith Hippo	T	2	220 Clerget	.....	360	....	115.5	101	7.4	655	13.4	1825 / 470	28.6	195	17,000	7.2	....	.....	...	2590	1481	386	363	360	38 10	24 6	8 0
B. A. T.	T	1	100 Mono Gnome	105@1250	230	....	1345 / 100	.....	9.1	550	16.8	1230 / 360	43.0	85	14,500	5.5	12.0	86.6	140	1260	866	164	50	180	24 8	20 8	7 5
Sopwith Snipe	T	1	200 B. R. 2.	228@1300	274	....	1205 /	107	4.9	1040	8.8	1075 / 760	17.6	400	19,000	7.1	8.6	.....	...	1950	.....	.....	321	180	.....	.....	...
De Haviland 9	T	2	260 Fiat	260@1400	438	....	117.5	107.5	9.0	580	16.0	1190 / 430	32.3	215	17,500	8.2	13.9	.....	...	3600	2460	595	185	360	42 6	30 6	10 0
Sopwith Rhino	T	2	200 B.H.P. Siddeley	240@1400	(612)	....	1625 / 103	.....	12.5	380	24.8	1445 / 210	.....	.....	12,000	5.9	15.0	.....	...	3590	2185	507	538	360	41 0	30 3	10 0
Sopwith Rhino	T	2	200 B.H.P. Siddeley	240@1400	(612)	....	1490 / 103	.....	13.5	350	26.8	1375 / 185	.....	.....	12,000	5.9	15.0	.....	...	3590	2185	507	538	360	.....	.....	...
Sopwith Rhino	T	2	200 B.H.P. Siddeley	240@1400	(612)	....	1455 /	.....	10.0	500	18.6	1375 / 325	.....	.....	14,500	5.0	12.8	.....	...	(3061)	(2185)	465	51	360	.....	.....	...
De Haviland 9	T	2	200 B.H.P. Siddeley	240@1400	438	....	114 / 1570	.....	9.5	540	17.3	1380 / 385	36.7	165	16,500	...	....	.....	...	.....	.....	.....	185	360	42 6	30 6	10 0
De Haviland 9	T	2	200 B.H.P. Siddeley	240@1400	438	....	108.5 / 1420	.....	11.0	465	20.2	1395 / 305	49.5	85	14,500	...	....	.....	...	.....	.....	.....	185	360	42 6	30 6	10 0
Sopwith Dolphin[8]	T	1	200 Hispano S.	210@2000	258	..	119.5 / 2040	.....	5.5	910	10.3	1360 / 685	.....	.....	19,000	7.6	9.4	.....	...	1970	.....	.....	101	180	32 6	22 6	8 0
Sopwith Dolphin[9]	T	1	200 Hispano S.	210@2000	258	....	111.5 / 1990	.....	6.5	800	11.7	1840 / 600	.....	.....	18,500	7.8	9.6	.....	...	2008	.....	.....	139	180	32 6	22 6	8 0
Sopwith Dolphin[10]	T	1	200 Hispano S.	210@2000	258	....	111.5 / 1990	.....	6.5	800	11.7	1825 / 600	.....	.....	18,500	7.8	9.7	.....	...	2018	.....	.....	149	180	32 6	22 6	8 0
Sopwith Snipe	T	1	200 B. R. 2.	228@1300	274	....	.....	110	4.9	1040	8.8	1825 / 760	17.6	400	19,500	7.2	8.6	87.9	180	1964	1212	251	321	180	30 0	18 7	9 0
Sopwith Snipe	T	1	200 B. R. 2.	228@1300	274	....	.....	114	4.4	1225	7.4	1190 / 1000	13.3	710	.....	.....	.....	.....	.....	.....	.....	.....	70	180	30 0	18 7	9 0
Bristol Fighter	T	2	200 B.H.P. Siddeley	240@1400	405	....	104	99	7.7	710	13.5	1195 / 550	25.2	320	20,000	6.9	11.7	.....	...	2810	1918	347	185	360	39 6	26 0	9 5
De Haviland 9	T	2	200 B.H.P. Siddeley	240@1400	438	....	1505 / 110 / 1525	101	10.4	500	18.7	1360 / 360 / 1365	38.8	160	16,500	7.6	13.8	.....	...	3316	2201	570	185	360	42 6	30 6	10

NOTE:
Loading, Lbs. per H. P.—Gross Weight ÷ Actual H. P. developed at normal revs. (A suffix *R* shows that *Rated H.P.* has been used in absence of *Actual H.P.*)
Lifting Surface—Surface of Wings and Flaps only.
Military Load—Weight of Guns, Bombs, Ammunition, and Reconnaissance Load.
Air Endurance—At 10,000′ Alt. at full throttle, including climb.
Service Ceiling—Height at which rate of climb is 100 ft./min.
Weight Empty—Includes Cooling Water for water-cooled engines.
[1]With reconn. load, and gap covered with triplex.
[2]With reconn. load, but with gap open.
[3]With 14-20 lb. bombs and gap covered with fabric.
[4]With 14-20 lb. bombs, but with gap open.
[5]Without cabane and Lewis gun. [6]With cabane and Lewis gun
[7]Two superimposed two-bladed D. G. B. 2610.
[8]With 2 Vickers guns only.
[9]With 2 Vickers guns and Lewis gun on top plane.
[10]With 2 Vickers guns and Lewis gun on cabane.
Comparative performance reduced to correspond with loadings of 14 lbs. per H.P. and 7 lbs. per sq. ft.

Austro-Daimler 200-Hp. Aircraft Engine

(*Continued from page* 132)

Effective valve port diameter	44.0 mm. (1.73 in.)
Width of seating	2.5 mm. (0.09 in.)
Angle of seating	45 deg.
Lift of valve	9.9 mm. (0.39 in.)
Diameter of stem	10.0 mm. (0.39 in.)
Length of valve guide	68.0 mm. (2.67 in.)
Overall length of valve	135.0 mm. (5.315 in.)
Number of springs per valve	One
Free length of spring	60.0 mm. (2.36 in.)
Length of spring in position (no lift)	46.0 mm. (1.81 in)
Mean diameter of coils	34.0 mm. (1.34 in.)
Diameter of wire	4.0 mm. (0.157 in.)
Ratio length of spring/lift of valve	4.61:1
Weight of valve complete with spring	0.50 lb.
Weight of spring bare	0.16 lb.
Inlet valve opens	10 deg. early
Inlet valve closes	30 deg. late
Period of induction	220 deg.
Inlet valve tappet clearance	0.25 mm. (0.01 in.)

Exhaust Valves

Number per cylinder	Two
Largest diameter	48.0 mm. (1.89 in.)
Effective valve port diameter	44.0 mm. = 1.73 in.
Width of seat	2.5 mm. (0.09 in.)
Angle of seat	45 deg.
Lift of valve	10.16 mm. (0.40 in.)
Diameter of stem	10.0 mm. (0.39 in.)
Length of valve guide	68.0 mm. (2.67 in.)
Overall length of valve	135.0 mm. (5.315 in.)
Number of springs per valve	One
Free length of spring	60.0 mm. (2.36 in.)
Length of spring in position (no lift)	46.0 mm. (1.81 in.)
Mean diameter of coils	34.0 mm. (1.34 in.)
Diameter of wire	4.0 mm. (0.157 in.)
Ratio length of spring/lift of valve	4.6:1
Weight of valve complete with spring	0.5 lb.
Weight of spring bare	0.16 lb.
Exhaust valve opens	45 deg. early
Exhaust valve closes	7 deg. late
Period of exhaust	232 deg.
Exhaust valve tappet clearance	0.304 mm. (0.012 in.)

Inertia Forces, Bearing Loads, Etc.

Weight of piston complete with rings and piston pin	4.18 lb.
Weight per sq.in. of piston area	0.188 lb.
Weight of connecting rod complete	4.84 lb.
Weight of reciprocating part of connecting rod	1.66 lb.
Total reciprocating weight per cylinder	5.84 lb.
Weight per sq. in. of piston area	0.263 lb.
Length of connecting rod (centers)	315.0 mm. (12.40 in.)
Ratio connecting rod/crank throw	3.6:1
Inertia lb./sq. in. piston area top center	63.8 lb./sq. in.
Inertia lb./sq. in. piston area bottom center	36.2 lb./sq. in.
Inertia lb./sq. in. piston area mean	25.0 lb./sq. in.
Weight of rotating mass of connecting rod	3.18 lb.
Total centrifugal pressure	610 lb.
Centrifugal pressure lb./sq. in. piston area	27.5 lb./sq. in.
Mean average fluid pressure including compression	47.0 lb./sq. in.
Mean average loading on crank pin bearing, total from all sources in terms of lb./sq. in. piston area	91.0 lb./sq. in.
Diameter of crank pin	56.0 mm. (2.20 in.)
Rubbing velocity	13.42 ft. per sec.
Effective projected area of big-end bearing	32.4 sq. cm. (5.02 sq. in.)
Ratio piston area/projected area of big-end bearing	4.42:1
Mean average loading on big-end bearing	402 lb./sq. in.
Load factor on big-end bearing	5400 lb./ft. sec.

Cylinders

Overall height of bare cylinder from top of base chamber	365.0 mm. (14.370 in.)
Depth of spigot at base of cylinder	15.0 mm. (0.590 in.)
Diameter of cylinder over water jacket	160.0 mm. (6.29 in.)
Thickness of flange at base of cylinder	11.0 mm. (0.433 in.)
Number of holding-down bolts per cylinder	Eight
Diameter of holding-down studs.	4 of 14.0 mm., 4 of 19.0 mm.
Thickness of water jacket	1.0 mm. (0.039 in.)
Mean thickness of combustion chamber wall	5.0 mm. (0.197 in.)
Thickness of cylinder barrel (top)	4.0 mm. (0.177 in.)
Thickness of cylinder barrel (center)	3.0 mm. (0.138 in.)
Thickness of cylinder barrel (bottom)	4.0 mm. (0.157 in.)
Diameter of water connections between cylinders	36.0 mm. (1.42 in.)

Piston

Type of piston	Aluminum; internal ribs
Diameter at top	134.0 mm. (5.275 in.)
Diameter at bottom	134.58 mm. (5.297 in.)
Length	110.5 mm. (4.35 in.)
Ratio, piston length cylinder bore	0.82:1
Number of rings per cylinder	Three
Position of rings	Above piston pin
Width of rings	7.0 mm. (0.275 in.)
Gap of rings in cylinder	0.48 mm. (0.019 in.)

Connecting Rod

Length between centers	315.0 mm. (12.40 in.)
Ratio connecting rod/crank throw	3.6:1
Little-end bearing, type	Plain phosphor bronze
Little-end bearing, diameter	28.0 mm. (1.10 in.)
Little-end bearing, length	67.0 mm. (2.64 in.)
Little-end bearing, projected area	18.70 sq. cm. (2.90 sq. in.)
Ratio piston area/projected area little-end bearing	7.66:1
Big-end bearing, type	Bronze shell, lined white metal
Big-end bearing, diameter	56.0 mm. (2.20 in.)
Big-end bearing, length (actual)	67.0 mm. (2.63 in.)
Big-end bearing, length (effective)	58.0 mm. (2.28 in.)
Big-end bearing, projected area.	28.4 sq. cm. (5.02 sq. in.)
Ratio piston area/projected area big-end bearing	4.42:1
Number of big-end bolts	Four
Full diameter of bolts	10.0 mm. (0.39 in.)
Total cross sectional area bottom of threads	2.04 sq. cm. (0.316 sq. in.)
Pitch of threads	1.5 metric
Maximum load due to inertia at 1400 r.p.m.	1390 lb.
Maximum load due to inertia at 1600 r.p.m.	1815 lb.
Load due to centrifugal force at 1400 r.p.m.	370 lb.

Complete Technical

Engine	Rated H.P.	Type	No. of Cyls.	Bore		Stroke		Bore and Stroke Ratio	B.H.P. & R.P.M. at Ground Level				Compression Ratio	Piston Speed, Ft./Min.	Order of Firing	Method of Cooling	M. E. P. Lbs. per Sq. In.	Inlet		
									Normal		Maximum							No.	Dia., Ins.	To Ar Sq.
				Mm.	Ins.	Mm.	Ins.		B.H.P.	R.P.M.	B.H.P	R.P.M.								
Curtiss OX5	90	V-90°	8	101.5	4	127	5	1.25 –1	93	1400	95	1450	4.5	1166	1L, 1R, 2L, 2R, 4L, 4R, 3L, 3R.	W	111	1	1.9094	2.
Curtiss VX	160	V-90°	8	127	5	177.8	7	1.41 –1	206	1350	214	1450	4.71	1575	1L, 1R, 2L, 2R, 4L, 4R, 3L, 3R.	W	110	1	2.7559	3.
Liberty 8	270	V-45°	8	127	5	177.8	7	1.40 –1	270	1700	285	1850	18%	1980	.....	W	115	1	2.5	3.
Liberty 12A	400	V-45°	12	127	5	177.8	7	1.40 –1	400	1700	430	1800	18%	1980	1L, 6R, 5L, 2R, 3L, 4R, 6L, 1R, 2L, 5R, 4L, 3R	W	115	1	2.5	3.
Hispano Suiza	150	V-90°	8	120	4.72	130	5.12	1.08 –1	150	1450	170	1700	4.8 –1	1240	1L, 4R, 2L, 3R, 4L, 1R, 3L, 2R	W	114	1	1.9685	2.
Hispano Suiza	180	V-90°	8	120	4.72	130	5.12	1.08 –1	180	1700	205	1800	5.3 –1	1450	1L, 4R, 2L, 3R, 4L, 1R, 3L, 2R	W	122	1	1.9685	2.
Hispano Suiza	300	V-90°	8	140	5.5	150	5.90	1.07 –1	300	1600	340	1800	5.3 –1	1578	1L, 4R, 2L, 3R, 4L, 1R, 3L, 2R	W	125	1	.....	.
LeRhone	80	Rotary	9	106	4.13	140	5.51	1.32 –1	80	1200	85	1300	1.33–1	1100	1, 3, 5, 7, 9, 2, 4, 6, 8	A	81	1	1.5629	1.
Gnome	100	Rotary	9	110	4.33	150	5.90	1.36 –1	103	1200	110	1300	4.0 –1	1180	1, 3, 5, 7, 9, 2, 4, 6, 8	A	88.7	0	.....	.
ABC Wasp	170	Radial	7	114.3	4.5	.....	5.9	1.31 –1	170	1750	200	1850	4.025	1690	1, 3, 5, 7, 2, 4, 6	A	115	1	2.17	3.
ABC Dragon-Fly	320	Radial	9	140	5.5	165	6.5	1.18 –1	320	1650	350	1750	4.025	1785.5 1650	1, 3, 5, 7, 9, 2, 4, 6, 8	A	114	1	2.6559	5.
BR1	150	Rotary	9	.....	6.72	.....	6.66	1.42 –1	154	1250	156	1300	5.9 –1	1394	1, 3, 5, 7, 9, 2, 4, 6, 8	A	94	1	1.77	2.
BR 2	200	Rotary	9	.....	5.51	.....	7.08	1.285–1	238	1300	242	1350	5.3 –1	1475	1, 3, 5, 7, 9, 2, 4, 6, 8	A	95.2	1	2.47	3.
Beardmore	160	Vert.	6	142	....	175	....	1.23 –1	178	1350	192	1450	4.56–1	1435	1, 5, 3, 6, 2, 4	W	103	1	2.559	..
Galloway	240	Vert.	6	145	5.71	190	7.48	1.31	236	1400	250	1500	4.96–1	1558	1, 5, 3, 6, 2, 4	W	116	1	2.7165	4.
Siddeley	240	Vert.	6	.....	5.71	.....	7.48	1.31	240	1400	250	1500	5 –1	1558	1, 5, 3, 6, 2, 4	W	118.1	1	2.5984	3.
Hispano	150	V-90°	8	.....	4.72	.....	5.12	1.08 –1	156	1500	165	1600	4.8 –1	1280	1, 4, 2, 3, 4, 1, 3, 2	W	114.75	1	1.9685	2.
Hispano	180	V-90°	8	.....	4.72	.....	5.12	1.08 –1	220	2000	225	2100	5.3 –1	1707	1, 4, 2, 3, 4, 1, 3, 2	W	121.8	1	1.9685	2.
Rolls-Royce Falcon 3	220	V-60°	12	.....	4.00	.....	5.75	1.44 –1	270	2200	280	2300	5.3 –1	2108	Rht. 1, 2, 5, 4, 3, 1, 6, 5, 2, 3, 4, 6	W	114	1	1.7496	2.
Rolls-Royce Eagle 8	360	V-60°	12	.....	4.5	.....	6.5	1.44 –1	350	1800	360	1900	5.3 –1	1950	Rht. 1, 2, 5, 4, 3. 1, 6, 5, 2, 3, 4, 6	W	124	1	2.0000	2.
Sunbeam Arab	200	V-90°	8	120	4.72	130	5.12	1.08 –1	217	2000	224	2100	5.3 –1	1710	1, 1A, 2, 2A, 4, 4A, 3, 3A	W	115	1	2.126	2.
Sunbeam Maori	250	V-60°	12	.....	3.94	.....	5.31	1.35 –1	265	2100	280	2200	5.6 –1	.....	1, 5, 3, 6, 2, 4	W	125	2	.....	.
Sunbeam Cossack	320	V-60°	12	.....	4.33	.....	6.30	1.45 –1	350	2000	364	2100	5 –1	2100	1, 5, 3, 6, 2, 4	W	121	2	1.6142	3.
Clerget 92	110	Rotary	9	120	4.72	.....	6.30	1.33 –1	122	1250	123	1300	4.36–1	1260	1, 3, 5, 7, 9, 2, 4, 6, 8	A	78	1	1.5748	1.
Clerget 92	130	Rotary	9	.....	4.72	.....	6.30	1.33 –1	127	1250	....	....	4.56–1	1312	1, 3, 5, 7, 9, 2, 4, 6, 8	A	81	1	1.692	2.
Hispano*	180	V-90°	8	.....	4.72	.....	5.12	1.08 –1	208	2000	225	2100	5.3 –1	1707	1, 4, 2, 3, 4, 1, 3, 2	W	121.8	1	1.9685	2.
Hispano*	200	V-90°	8	.....	4.72	.....	5.12	1.08 –1	220	2000	215	2100	4.8 –1	1707	1, 4, 2, 3, 4, 1, 3, 2	W	115	1	1.9685	2.
Lorraine Dietrich	275	V-90°	8	120	4.72	175	6.89	1.46 –1	278	1650	....	....	.....	.....	.....	...	.....	...	.....	...
Fiat A12bis	275–300	Vert.	6	160	6.3	180	.....	1.12	304–290	1600	325	1760	4.31–1	1653	1, 5, 3, 6, 2, 4	W	105	2	2.00	5.
Fiat A14	600	Vert.	12	.....	6.69	.....	8.27	1.235–1	700	1500	725	1600	.....	.....	.....	W	108	.	.....	.
I.F. V5	200	Vert.	8	130	....	190	....	. . . .	250	1400	268	1600	5	1995	.....	W	107.6	.	.....	.
Spa 6A	200	.....	6	135	....	170	....	.....	210	1600	225	1700	5	1895	.....	....	116.6	.	.....	.
Benz	220	Vert.	6	145	....	190	....	.....	230	1400	252	1650	4.93	1745	.....	W	113	.	2.244	.
Maybach	200	Vert.	6	150	....	190	....	.....	200	1200	....	....	.....	1496	.....	W	107.4	.	1.8998	.
Mercedes	160	Vert.	6	140	....	160	....	.....	150	1250	....	....	4.8–4.52	1312	.....	....	105.2	.	.....	.
Mercedes	260	Vert.	6	160	....	180	....	.....	252	1400	260	1500	4.94	1635 at 1400	.....	....	107.5	.	2.3622	.
Oberursel	110	.....	....	.....	....	.....	....	.....	.....	....	....	....	.....	.....	.....	....	.....	.	.....	.

*French.

ical Specifications of Important Am

Details of 37 Different Types as Compiled
of the Division of Military A

(*November* 1, 1918)

	Valves per Cylinder								Carburetor			Magneto				Oil Pump			Water Pump			Air	
	Inlet				Exhaust																		
	No.	Dia., Ins.	Total Area, Sq. Ins.	Lift, Ins.	No.	Dia., Ins.	Total Area, Sq. Cms.	Lift, Ins.	No.	Type	Weight Each, Lbs.	No.	Type	Speed x E. S.	Weight Each, Lbs.	No.	Type	Weight, Lbs.	No.	Type	Weight, Lbs.	No.	Typ
	1	1.9094	2.0623	.3437	1	1.9094	2.3267	.3878	1	Zenith Duplex	4.2	1	Berling	2	21	1	Gear	.....	1	Centrif.	.....	.	Nil
	1	2.7559	3.2366	.3740	1	2.7559	3.2366	.3740	2	Zenith Duplex	.....	1	.....	2	.....	3	Gear	.....	1	Centrif.	.....	.	Nil
	1	2.5	3.4344	.4375	1	2.5	2.9437	.3750	1	Zenith Duplex	7	1	Twin Delco Generator, 8-volt	1.5	.....	3	Gear	.....	1	Centrif.	.....	1	Plung
	1	2.5	3.4344	.4375	1	2.5	2.9437	.3750	2	Zenith Duplex U. S. 52	.....	1	Twin Delco Generator, 8-volt	1.5	.....	3	Gear	.....	1	Centrif.	.....	1	Plung
	1	1.9685	2.4350	.3937	1	1.9685	2.4350	.3937	1	Zenith Duplex 48 D.C.	7.0	2	8-Cyl. Dixie Transverse	2	.....	1	Eccentric Vane Type	.....	1	Centrif.	.....	1	Plung
	1	1.9685	2.9350	.3937	1	1.9685	2.4350	.3937	1	Zenith Duplex 58 D.C.	9.5	2	8-Cyl. Dixie Transverse	2	.....	1	Eccentric Vane Type	.....	1	Centrif.	.....	1	Plung
	1	.....	.....	.....	1	.....	.....	.....	1	Zenith Duplex 58 D.C.	9.5	2	8-Cyl. Dixie Transverse	2	.....	1	Gear	.....	1	Centrif.	.....	1	Plung
	1	1.5629	1.7313	.3593	1	1.5629	1.4492	.2952	1	Mixing Valve	4.19	1	A.D.S. 26° Early	9/4	9.10	1	Plunger	4.125	.	.....	.....	.	....
.7	0	.....	.....	.....	1	.....	.....	.....	1	Mixing Valve	.....	1	.....	9/4	.....	1	Two Plunger	...	.	.....	.....	.	....
	1	2.17	3.23	.4700	2	1.338	2.4800	.2950	2	A. B. C. Injectors	.....	2	P. L. 7. M. L. P.	1.75	.....	1	Gear	.....	.	.....	.....	.	....
	1	2.6559	5.4537	.6535	2	1.6929	2.2992	.4330	2	H. C. 8	.....	2	M. L. 9	1.18	13.5	1	Plunger Distributed	.....	.	.....	.....	.	....
	1	1.77	2.41	.4300	1	2.000	2.7300	.4300	1	Block Tube	5	2	A. D. S. M. L.	2.25	10	1	Plunger	6.63	.	Nil	.....	1	Plung
.2	1	2.47	3.9554	.5100	1	2.28	3.6510	.5100	1	Block Tube	.....	2	M. L.	.....	10	1	Plunger	6.63	.	Nil	.....	1	Plung
	1	2.559	.....	.....	1	2.5590	.....	.....	2	Zenith	5.75	2	D. U. 6 S.	1.5	16	1	.....	.....	1	Centrif.	4.9	.	....
	1	2.7165	4.0455	.4724	2	1.8110	4.2346	.4724	2	48 Zenith RA	3.25	2	E. M. 6	1.5	15	1	Rotary	4.06	1	Centrif.	6.51	1	Plung
.1	1	2.5984	3.9060	.4724	2	1.7322	5.2080	.4724	2	Zenith	4.2	2	E. M. 6	1.5	15	2	Gear	4.1	1	Centrif.	7.2	1	Plung
.75	1	1.9685	2.4350	.3937	1	1.9685	2.4350	.3900	1	Zenith Duplex 48 D.C.	7.0	2	1A8S	E. S.	17.75 18.12	1	Eccentric Vane	.....	1	Centrif.	2.69	1	Plung
.8	1	1.9685	2.4350	.3937	1	1.9685	2.4350	.3900	1	Zenith Duplex 58 D.C.	9.5	2	1A8S. 1AB	E. S.	18.12 17.75	2	Eccentric Vane	.....	1	Centrif.	2.69	.	Plung
	1	1.7496	2.4211	.4437	1	1.7496	2.4211	.4400	2	R.R.C.H. 38M.	.....	2	Watford	1.5	14.25	1	Rotary	.....	1	Centrif.	.....	2	Plung
	1	2.0000	2.9155	.4850	1	2.0000	2.9155	.4800	2	R.R.C.H. Duplex 42 m/m.	13.000	4	Watford	1.5	14.25	2	Gear	8.75	1	Centrif.	4.625	1	Plung
	1	2.126	2.3631	.3543	2	1.2598	2.8088	.3543	1	C.H.H.C. 7	.....	2	B.T.H. A8S	E. S.	12.8	3	Gear	.....	1	Centrif.	3	1	Plung
	2	.....	.....	.3543	2	.....	.....	.3500	4	C.H.B.Z.S. 42 m/m.	.....	4	W.B.G.	1.5	19.1	3	Gear	.....	1	Centrif.	.....	1	Plung
	2	1.6142	3.6952	.3543	2	1.6142	1.8476	.3500	4	C.H.B.Z.S. 42 m/m.	.....	4	B6 or W.B.G.	1.5	19.1	3	Gear	.....	1	Centrif.	.....	1	Plung
	1	1.5748	1.9423	.3937	1	1.9685	2.8031	.4528	1	Block Tube Bosch D.A.L.	4.41	2	A.D.S.	E. S.	9-10	1	Gear	6.63	.	.....	.....	1	Plung
	1	1.692	2.24	.3900	1	1.9685	3.038	.4527	1	Block Tube	5.0	2	A.D.S.	2.25	9-10	1	Plunger	6.63	.	Nil	.....	1	Plung
									1	Zenith Duplex 58 D.C.	9.5	2	1ABS. 1AB	E. S.	18.12 17.75	2	Eccentric Vane	.....	1	Centrif.	2.69	1	Plung
.8	1	1.9685	2.4350	.3900	1	1.9685	2.4350	.3931															
5	1	1.9685	2.4350	.3900	1	1.9685	2.4350	.3937	1	Zenith Duplex 58 D.C.	9.5	2	S.E.V.	E. S.	16-3	1	Eccentric Vane	.....	1	Centrif.	.....	1	Plung
...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	2	2.00	5.5180	.4300	2	2.0078	5.518	.4375	1	Siemens	.....	2	6-Cyl. Dixie 60-V.	1.5	.....	3	Gear	.....	1	Centrif.	.....	1	Plung
8	.	.....	.....	.....	.	.....	.....	.....	.	.....	.....	.	.....	.....	.....	.	.....	.....	1	Centrif.	.....	.	....
.6	.	.....	.....	.....	.	.....	.....	.....	.	.....	.....	2	.....	.....	.....	.	.....	.....	.	.....	.....	.	....
.6	.	.....	.....	.....	.	.....	.....	.....	.	.....	.....	2	.....	.....	.....	.	.....	.....	.	.....	.....	.	....
3	.	2.244	.....	.....	.	2.244	.....	.....	.	.....	.....	2	2H6 Bosch	.....	.....	.	Gear	.....	.	Centrif.	.....	.	....
.4	.	1.8998	.....	.....	.	1.3779	.....	.....	2	Maybach	.....	2	2H6 Bosch	.....	.....	1	Plunger	.....	.	Axial Turb.	.....	.	....
.2	.	.....	.....	.....	.	.....	.....	.....	.	Duplex	.....	2	2H6 Bosch	.....	.....	2	Plunger	.....	.	.....	.....	.	....
.5	.	2.3622	.....	.....	.	2.3622	.....	.....	1	Mercedes	.....	2	Bosch	.....	.....	.	Mercedes 4-Plunger	.....	.	Axial Turb.	.....	.	....
...	.	.....	.....	.....	.	.....	.....	.....	.	.....	.....	.	.....	.....	.....	.	.....	.....	.	.....	.....	.	....

NOTES.—(1) This data chart includes the important engines, both foreign and United States. It does not include experimental nor obsolete types, no

American and Foreign Airplane

ed by the Technical Section
y Aeronautics

	Air Pump					Overall Dimensions			Fuel & Oil Hr. Pints		Fuel & Oil Hr. Lbs.		Total Fuel & Oil per Hr.		Consumption per B.H.P. Hour					
															Pints		Lbs.		Combined	
	No.	Type	Weight, Lbs.	Ratio of Gear Reduction	Speed of Propeller	Tractor or Pusher	Length, M/M.	Width, M/M.	Height, M/M.	Fuel	Oil	Fuel	Oil	Pts.	Lbs.	Fuel	Oil	Fuel	Oil	Pts.	Lbs.
	.	Nil	.....	Nil	E. S.	Either	1408	753	841	47	1.66	42.3	1.86	48.66	44.16	.51	.018	.46	.02	.528	.48
	.	Nil	.....	Nil	E. S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1	Plunger	.....	Nil	E. S.	Either	.....	.....	1020	168.8	13.44	132	12.2	182.24	182.2	.606	.0214	.547	.050	.627	.597
	1	Plunger	.....	Nil	E. S.	Either	1755	.....	1020	256	.....	189	13.8	192.8	192.8	.565	.0199	.509	.037	.585	.546
	1	Plunger	.....	Nil	E. S.	Either	1308	851	832	.....	.....	78	7.5	.....	85.5	....	.....	.52	.05	....	.57
	1	Plunger	.....	Nil	E. S.	Either	1308	851	832	.....	.....	114.8	.....	.....	127.2	....	.....	.52	.056	....	.576
	1	Plunger	.....	Nil	E. S.	Either	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	....	....	....	....
	.	.....	.....	Nil	E. S.	Either	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	.56	.19	....	.75
	.	.....	.....	Nil	E. S.	Either	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	.72	.18	....	.90
	.	.....	.....	Nil	E. S.	T.	35.7″	42.20″	42.20″	92	2.8	82	3	94.8	85	.55	.026	.495	.019	.567	.514
	.	.....	.....	.....	E. S.	T.	1070	1232	1207	.....	.....	179	12.5	.....	191.5	....	.....	.56	.02	....	....
	1	Plunger	4.7	Nil	E. S.	Either	43.5″	47.50″	41.57″	103.2	15	92.88	16.87	118.2	109.75	.661	.097	.59	.109	.758	.699
	1	Plunger	.....	Nil	E. S.	Either	.....	.....	.....	161	15.2	144.9	17.1	176.2	162	.7	.066	.63	.074	.766	.702
	.	.....	.....	Nil	E. S.	Either	57.08″	19.92″	31.88″	103.2	5.3	93	5.96	108.5	98.96	.52	.032	....	....	.609	.552
	1	Plunger	.88	Nil	E. S.	Either	67.32″	20.07″	42.91″	136.8	6.4	123.25	7.2	143.2	130.45	.58	.027	.52	.03	.607	.55
	1	Plunger	.7	Nil	.....	Either	69.88″	24.09″	43.62″	134.4	13.2	121	14.85	147.6	135.85	.56	.055	.50	.062	.615	.562
	1	Plunger	15 oz.	Nil	E. S.	Either	51.53″	33.46″	32.67″	90.5	6	81.45	6.75	96.5	88.2	.58	.038	.52	.043	.618	.563
	.	Plunger	.....	Nil	E. S.	Either	47.24″	33.46″	33.34″	127	11	114.8	12.4	138.6	127.8	.58	.05	.52	.056	.63	.576
	2	Plunger	2.75	.59–1	1300 r.p.m.	Either	72.04″	37.24″	42.00	154	7.15	138.6	8.04	161.15	146.6	.56	.026	.53	.026	.586	.559
	1	Plunger	2.875	.6–1	1080	Either	75.98″	42.52″	48.03	196	8.75	176.4	9.84	204.7	186.2	.56	.025	.5	.028	.585	.528
	1	Plunger	.....	45–27	1200	T.	1105	810	903	108.5	7.8	97.65	8.8	116.3	105.46	.50	.036	.45	.04	.536	.49
	1	Plunger	.....	2–1	½ E. S.	Either	55.11″	35.46	33.85	150	6.2	135	6.97	161.2	141.97	.56	.023	.51	.026	.583	.536
	1	Plunger	.....	2–1	½ E. S.	Either	61.81″	37.79	38.89	196	12	176.4	13.5	208	189.9	.56	.034	.50	.038	.594	.538
	1	Plunger	4.8	.....	E. S.	Either	36.22″	40.15″	40.15″	81.5	16	73.35	18	97.5	91.35	.667	.131	.6	.147	.798	.747
	1	Plunger	4.7	Nil	E. S.	Either	36.22″	40.15″ Dia.	40.15″	85.2	13.85	76.68	15.58	99.05	92.26	.67	.109	.60	.123	.779	.723
	1	Plunger	15 oz.	Nil	E. S.	Either	47.24″	33.46″	33.34″	127	11	114.8	12.4	138.6	127.8	.58	.05	.52	.056	.63	.576
	1	Plunger	13 oz.	24x41 or 21x28	1170 or 1500	Either	51.18″	33.46″	33.26″	124.8	13	112.3	14.62	137.8	126.9	.6	.06	.54	.067	.66	.607
	1	Plunger	.....	Nil	E. S.	Either	.....	.....	.....	156	6.8	140	7.65	162.8	147.6	.55	.024	.49	.027	.574	.517
	.	.....	.....	.....	.....	.....	.....	.....	.....	367.4	29.3	330.7	33	396.7	363.7	.52	.042	.47	.047	.562	.517
	.	.....	.....	.....	1400	Either	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	.485	.033	....	....
	.	.....	.....	.....	1600	Either	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	.473	.033	....	....
	.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	.653	.02	....	....
	.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	.....	.....	....	....
	.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	.6	.029	....	....
	.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	.605	.032	....	....
	.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	....	....	....	....

ete types, nor engines of very limited use. (2) Units are U. S. gallons, lbs., feet, unless otherwise stated.

irplane Engines

Consumption per B.H.P. Hour						Weight of Engine Dry		Weight of Engine in Running Order Less Fuel Oil and Tanks		Weight of Engine with Fuel Oil and Tanks for 6 Hours Running		Torque in Lbs. Ft.	Estimated B.H.P. at				Estimated Fuel Consumptions Pints per Hour Ground Level Carburetor Adjustments, No Altitude Control			
Pints		Lbs.		Combined																
Fuel	Oil	Fuel	Oil	Pts.	Lbs.	Lbs.	Lbs./ B.H.P.	Lbs.	Lbs./ B.H.P.	Lbs.	Lbs./ B.H.P.		6000 Ft.	10,000 Ft.	15,000 Ft.	20,000 Ft.	6000 Ft.	10,000 Ft.	15,000 Ft.	20,000 Ft.
51	.018	.46	.02	.528	.48	385	4.2	445	4.8	6765	7.3	371	76	67.3	57.5	49.4	42.6	40.1	37.1	34.4
606	.0214	.547	.050	.627	.597	575	2.12	.....	....	.....	....	....	260	181	148	116	112	100	87	75
565	.0199	.509	.037	.585	.546	845	2.11	1151.5	2.88	.....	....	....	320	272	220	172	163	144	125	108
...	.....	.52	.05	....	.57	440	2.93	.....	....	.....	....	....	.....	.....	.....	.....	.....	.....	.....	.....
...	.....	.52	.056	....	.576	485	2.69	.....	....	.....	....	....	.....	.....	.....	.....	.....	.....	.....	.....
...	.....	....	....	....	....	596	1.98	.....	....	.....	....	....	.....	.....	.....	.....	.....	.....	.....	.....
...	.....	.56	.19	....	.75	245	3.05	.....	....	.....	....	....	.....	.....	.....	.....	.....	.....	.....	.....
...	.....	.72	.18	....	.90	270	2.7	.....	....	.....	....	....	.....	.....	.....	.....	.....	.....	.....	.....
55	.026	.495	.019	.567	.514	260	1.53	260	1.53	820	4.82	510	138.11	122.24	104.37	89.67	83.53	78.56	72.68	67.34
...	.....	.56	.02	....	....	600	1.88	600	1.88	.....	....	1019	256	218	176	138	149	134	116	100
661	.097	.59	.109	.753	.699	405	2.6	405	2.6	1129.35	7.8	655	129	114.2	97.5	83.7	93.7	88.1	81.5	75.5
7	.066	.63	.074	.766	.702	475	2	475	2	1544	6.5	961	196.8	174.2	148.75	127.8	146.2	137.5	127.2	117.8
52	.032	....	....	.609	.552	592	3.3	713	4	1366	7.6	692	147.2	130.3	111.25	95.6	93.7	88.1	81.5	75.5
58	.027	.52	.03	.607	.55	690	2.95	843	3.57	1704	7.2	885	195.2	172.75	147.5	126.7	124.2	116.8	108	100.1
56	.055	.50	.062	.615	.562	625	2.6	781	3.25	1677.6	7.0	900	198.5	175.7	150	129	122	114.7	106.2	98.4
58	.038	.52	.043	.618	.563	455	2.9	657.4	4.29	1239.5	7.9	546	129	114.2	97.5	83.8	82.2	77.3	71.5	66.25
58	.05	.52	.056	.63	.576	510	2.32	653	2.97	1492	6.67	583	182	161	137.5	118	115.8	109	100.8	93.5
56	.026	.53	.026	.586	.559	723	2.68	912	3.38	1880	6.9	694	227.4	201.3	171.8	147.6	139.8	131.5	121.6	112.7
56	.025	.5	.028	.585	.528	933	2.66	1177	3.37	2406	6.9	1020	289.5	256.2	218.75	188	178	167.4	154.8	143.5
50	.036	.45	.04	.536	.49	550	2.5	686	3.16	1389	6.4	570	179.5	158.8	135.6	116.5	98.5	92.6	85.7	79.4
56	.023	.51	.026	.583	.536	890	2.3	1065	3.95	2002	7.8	662	219	194	165.6	142.3	136.2	128.1	118.5	109.8
56	.034	.50	.038	.594	.538	1118	3.2	1345	3.8	2598	7.4	919	289.5	256.2	218.75	188	178	167.4	154.8	143.5
667	.131	.6	.147	.798	.747	367	3	367	3	970	8	512	101	89.3	76.25	65.5	74	69.6	64.4	59.6
67	.109	.60	.123	.779	.723	400	3.15	400	3.15	1009	8	533	105	93	79.4	68.2	77.3	72.7	67.3	62.3
58	.05	.52	.056	.63	.576	510	2.32	653	2.97	1492	6.67	583	182	161	137.5	118	115.8	109.0	100.8	93.5
6	.06	.54	.067	.66	.607	503	2.42	638	3.1	1475.6	7.8	546	172	152.25	130	111.7	113.3	106.6	98.6	91.3
55	.024	.49	.027	.574	.517	928	3.32	1110	3.96	2084	7.44	920	215	190.3	162.5	139.6	141.6	133.2	123.2	114.2
52	.042	.47	.047	.562	.517	1565	2.36	2020	2.9	4420	6.3	2450	580	512.4	430.75	370.6	306.2	313.7	290.25	268.9
...	.....	.485	.033	....	....	825	3.95	.....	....	.....	....	....	.....	.....	.....	.....	.....	.....	.....	.....
...	.....	.473	.033	....	....	539	3.21	.....	....	.....	....	....	.....	.....	.....	.....	.....	.....	.....	.....
...	.....	.653	.02	....	....	829	3.68	.....	....	.....	....	....	.....	.....	.....	.....	.....	.....	.....	.....
...	.....	....	....	....	....	....	....	.....	....	.....	....	....	.....	.....	.....	.....	.....	.....	.....	.....
...	.....	.6	.029	....	....	618	3.86	.....	....	.....	....	....	.....	.....	.....	.....	.....	.....	.....	.....
...	.....	.605	.032	....	....	935	3.75	.....	....	.....	....	....	.....	.....	.....	.....	.....	.....	.....	.....
...	.....	....	....	....	....	....	....	.....	....	.....	....	....	.....	.....	.....	.....	.....	.....	.....	.....

Load due to centrifugal force at 1600 r.p.m.	485 lb.
Total load on bolts at 1400 r.p.m.	1760 lb.
Total load on bolts at 1600 r.p.m.	2300 lb.
Stress per sq. in. at 1400 r.p.m.	5570 lb./sq. in.
Stress per sq. in. at 1600 r.p.m.	7280 lb./sq. in.

Crankshaft

Number and type of main bearings	Seven, bronze cage, lined white metal
Cylinder centers	166.0 mm. (6.53 in.)
Crankpins	
Outside diameter	56.0 mm. (2.20 in.)
Inside diameter	30.0 mm. (1.18 in.)
Length	68.0 mm. (2.67 in.)
Journals	
Outside diameter	58.0 mm. (2.28 in.)
Inside diameter (front two)	21.0 mm. (0.82 in.)
Inside diameter (others)	30 mm. (1.18 in.)
Length, propeller end	56.0 mm. (2.20 in.)
Length, rear end	43.5 mm. (1.71 in.)
Length, center	50.0 mm. (1.97 in.)
Length, intermediate	50.0 mm. (1.97 in.)

Crank Webs

Width	74.0 mm. (2.91 in.)
Thickness (front two)	24.5 mm. (0.96 in.)
Thickness (others)	24.0 mm. (0.94 in.)
Radius at ends of journals and crankpins	4.5 mm. (0.17 in.)
Weight of complete shaft	96.5 lb.

Working Clearances

Piston clearance top (total)	1.00 mm. (0.039 in.)
Piston clearance bottom (total)	0.42 mm. (0.016 in.)
Side clearance of connecting rod in piston (total)	2.50 mm. (0.098 in.)
Side clearance of connecting rod on crankpin (total)	1.00 mm. (0.039 in.)
End clearance of crankshaft in main bearings	2.00 mm. (0.079 in.)

Lubrication System

Number and type of oil pumps	One plunger
Oil consumption per hour	8.75 U. S. pints
Oil consumption per b.hp. hour	0.044 U. S. pint = 0.039 lb.
Oil pressure	50 deg. C.
Oil temperature	5 lb. per sq. in.
Specific gravity of oil	0.899
Ratio pump speed/crankshaft speed	1:15

Ignition

Number and type of magnetos	Two Bosch Z.H.6
Firing sequence of engine	Propeller 1-5-3-6-2-4
Ignition timing (fully advanced)	20 deg. E to 40 deg. E, variable
Number of plugs per cylinder	Two
Type of plugs	Bosch 3-point
Ratio magneto speed/crankshaft speed	1.5:1

Cooling System

Number and type of water pumps	One centrifugal
Diameter of inlet pipe	36.0 mm. (1.42 in.)
Diameter of outlet pipe	36.0 mm. (1.42 in.)
Diameter of rotor	112.0 mm. (4.40 in.)
Number and type of radiators	One honeycomb
Ratio water pump speed/engine speed	1.894:1
Water temperature inlet	54.5 deg. C.
Water temperature outlet	60.0 deg. C.

Air Pump

Type of air pump	Cam-operated plunger
Bore	38.0 mm. (1.496 in.)

Weights

Weight of complete engine, dry, with propeller boss and exhaust manifold	728.5 lb.
Weight per b.hp. ditto	3.64 lb.
Weight of fuel per hour	100.00 lb.
Weight of oil per hour	7.86 lb.
Total weight of fuel and oil per hour	107.86 lb.
Gross weight of engine in running order, less fuel and oil (cooling system) at 0.65 lb. per b.hp.	858.50 lb.
Weight per b.hp. ditto	4.29 lb.
Gross weight of engine in running order, with fuel and oil for six hours' running (tankage at 10 per cent weight of fuel and oil)	1570.4 lb.
Weight per b.hp.	7.85 lb.

Overall Dimension

Height	1150 mm.
Length	1724 mm.
Width	568 mm.

GENERAL ANALYSIS OF WEIGHTS

Description of part	No. per Set	Average unit weight in lb.	Weight of complete set in lb.	Percentage of total weight
Cylinders, bare	6	18.43	110.62	15.30
Detachable inlet valve pockets	6	1.06	6.37	0.87
Pistons, complete with rings	6	3.52	21.12	2.90
Piston pins	6	0.66	4.00	0.54
Connecting rods	6	4.84	29.04	3.98
Crankshaft	1	96.50	96.50	13.24
Inlet valves	12	0.34	4.12	0.56
Exhaust valves	12	0.34	4.12	0.56
Inlet exhaust valve springs	24	0.16	3.88	5.53
Valve collars and locking cones	24	0.09	2.19	0.30
Valve rockers (with bearings)	12	1.25	15.00	2.06
Camshaft	1	10.25	10.25	1.40
Camshaft casing complete	1	34.50	34.50	4.74
Half compression gear	1	2.69	2.69	0.36
Vertical camshaft driving spindle (complete)	1	6.81	6.81	0.93
Vertical spindle housing	1	1.62	1.62	0.22
Camshaft bevel sprocket	1	3.15	3.15	0.43
Crankcase, top half	1	107.00	107.00	14.68
Crankcase, bottom half	1	73.50	73.50	10.09
Bearing caps	7	2.27	15.93	2.19
Main holding-down bolts	14	0.75	10.50	1.44
Thrust race complete	1	5.28	5.28	0.72
Propeller hub	1	11.31	11.31	1.55
Carbureters	1	24.06	24.06	3.30
Induction pipes	2	4.25	8.50	1.16
Exhaust pipes	6	2.33	14.00	1.92
Oil pump	1	11.81	11.81	1.62
Oil leads with relief valve	1	4.56	4.56	0.62
Magnetos	2	14.37	28.75	3.94
High tension leads with casing	1	4.75	4.75	0.65
Magneto and throttle controls	1	2.12	2.12	0.29
Water pump	1	7.62	7.62	1.04
Water pipes	1	6.56	6.56	0.90
Air pump	1	1.62	1.62	0.22
Rev. counter drive	1	0.75	0.75	0.10
Gun gear with case	1	5.81	5.81	0.80
Miscellaneous parts	1	28.09	28.09	3.85
Total			728.50	100.00

French Airplanes in Service at the Front

(April, 1918)

Airplanes		Engines		Speed on the Level in M.P.H.				Duration of Climb				Theoretical Ceiling, Ft.	Hours of Flying Under Full Power at Ground Level	Armament		Total Load, Lb.	Division of Load					Weight Empty, Lb.	Total Weight in Flying Order, Lb.	Load per H.P., Lb.	Span, Ft.	Length, Ft.	Height, Ft.	Total Surface, Sq. Ft.	Load per Sq. Ft., Lb.
Make	Type	Make and Type	Maximum Power Permitted	At 6500 Ft.	At 9800 Ft.	At 13,100 Ft.	At 16,400 Ft.	To 6500 Ft.	To 9800 Ft.	To 13,100 Ft.	To 16,400 Ft.			Machine Guns with Mountings	Bomb Carriers Provided for Dropping:		Fuel and Oil, Lb.	Crew, Lb.	Armament, Lb.	Miscellaneous, Lb.	Bombs, Lb.							
Army Planes																												
A. R. (484 sq. ft.), radiator in the wing.	A.R.L. 1A2	Renault 8Gdy	200	92	87	81	.....	M. S. 11	M. S. 20	M. S. 33 10	M. S. ...	16,400	H. M. 2 30	Vick. front Turr. rear	4–264	936	308	352	165	110	.....	1815	2750	13.75	39.4	28.74	9.85	484.5	5.72
			1600	1620	1590	1550																						
A. R. (484 sq. ft.)	A.R.L. 2A2	Renault 8Gc	190	82	79	73.5	.....	14 45	28 20	...	...	.....	2 45	Vick. front Turr. rear	4–264	936	308	352	165	110	.....	.....	.....	.....	39.4	30.55	9.85	484.5	.....
			1600	1580	1530	1490																						
Breguet (560 sq. ft.) with ailerons.	Bre. 14A2	Renault 12Fcx	300	109.5	107	104.5	100	6 50	11 35	18 30	29 30	.....	2 45	Vick. front Turr. rear	4–264	1157	475	352	198	132	.....	2222	3380	11.45	47.12	29.58	10.82	560	6.15
			1600	1580	1560	1540	1510																					
Breguet (528 sq. ft.)	Bre. 14A2	Renault 12Fcy	310	114	108	107.5	02.5	7 40	12 10	17 35	25 40	.....	2 45	Vick. front Turr. rear	4–264	1157	475	352	198	132	.....	2222	3380	10.90	46.00	29.22	10.82	528	6.38
			1600	1000	1550	1520	1500																					
Breguet Fiat	Bre. 14A2	Fiat A12	285	110	07.5	103	94	15	15 50	25 50	37 50	20,300	3	Vick. front Turr. rear	4–264	1157	475	352	198	132	.....	2288	3447	12.10	46.00	.....	.....	528	6.54
			1600	1580	1570	1520	1470																					
Caudron G6	Cau. 6A2	Rhone 9Jb	130	94	91	84.5	.....	7 35	13 40	24 55	...	15,400	1 45	Supp. front Turr. rear	4–264	1100	383	352	169	196	.....	2074	3170	12.20	55.7	28.22	9.68	427	7.42
			2x— 1280	1310	1285	1205																						
Sopwith	Sop. 1A2	Clerget 9Bc or	145	104	100	93.5	.....	12 45	23 40	41 20	...	.....	2 15	Vick. front Turr. rear	4–264	880	264	352	169	94.5	.....	1157	2040	15.07	33.6	25.60	10.16	344.5	5.93
			1300	1310	1285	1230																						
Sopwith	Sop. 1A2	Rhone 9Jby	135	.....	97	.....	....	10 40	17 40	..	...	.....	2 15	Vick. front Turr. rear	4–264	880	264	352	169	94.5	.....	1157	2040	15.07	33.6	25.60	10.16	344.5	5.93
			1350	1300	1270																							
Salmson*	Sal. 2A2 and Sal. 2bis A2	Salmson 9Z	270	116	112.5	109	104	7 15	11 40	17 20	27 30	0,300	2 45	Vick. front Turr. rear	4–264	1120	440	352	198	132	.....	1676	2800	10.34	38.5	27.90	9.52	398	6.95
			1600	1620	1590	1560	1520																					
Spad 2-seater	Spa. 11A2	Hispano 8Bc	235	112.5	110.5	105	....	7 35	12 30	17 30	.....	20,800	2 15	Vick. front Turr. rear	4–264	825	264	352	150	59	.....	1485	2310	11.00	36.8	25.45	8.54	323	7.16
			2150	2125	2095	2050																						
Spad 2-seater*	Spa. 16A2	Lorraine 8Bb	250	115	.....	.....	....	7	11 50	18 15	31	.....	1 45	Vick. front Turr. rear	4–264	825	264	352	150	59	.....	1526	2350	9.46	36.8	25.45	8.54	323	7.28
			1650	1650																								
Caudron R11*	Cau. 11A3	Hispano 8Bda	215	114.5	111.5	08.5	02.5	8 10	14 30	22 30	39	19,350	3	Turr. front Turr. rear	6–264	1684	792	528	231	132	.....	3124	4760	11.00	58.9	36.80	9.18	583	8.18
			2x— 2150	2230	2115	2185	2080							Emerg. gun														
Letord	Let. 1A3	Hispano 8A2	175	92	88.5	84	....	12	21 30	36	...	17,000	3	Turr. front Turr. rear	6–264	1415	524	528	207	156	.....	2758	4178	11.88	59.00	36.80	12.14	661	6.34
			2x— 1700	1690	1655	1600								Emerg. gun														
Letord	Let. 2A3	Hispano 8Bda	215	98	96	92	.....	9 30	16	27	...	17,700	3	Turr. front Turr. rear	6–264	1685	792	528	220	143	.....	3562	5200	11.88	59.00	36.80	12.14	661	7.46
			2x— 2150	2125	2075	2035								Emerg. gun														
Letord	Let. 5A3	Lorraine 8Ba	250	97.5	94.5	88	.....	10	18	31	...	16,050	3	Turr. front Turr. rear	....	1730	835	528	220	143	.....	3650	5380	10.78	59.02	36.70	12.14	680	7.87
			2x— 1650	1670	1630	1590								Emerg. gun														
Bombing Planes																												
Breguet*	Bre. 14B2	Renault 12Fcx	300	110	106.5	103	.....	9 15	16 30	26	47	19,000	2 45	Vick. front Turr. rear	32–253	1610	475	352	150	110	520	2280	3880	13	46	29.2	10.8	560	6.95
			1600	1560	1530	1500									8–440													
Caproni	Cap. Bn3	3 Isotta F	180	84	81	78	.....	23 50	39 10	60	...	.....	.....	Turr. front Turr. above	4–264 2 G.P.	3300	1880	352	123	66	880	5420	8730	16.2	73.5	36.1	13	990	8.84
			3x— 1500	1530	1500	1460																						
Sopwith	Sop. 1B1	Clerget 9Bb	135	.....	.....	.....	.....	...	...	...	...	.....	4 15	Supp. above	18–264 or 6–340 or 12–264 2–340	1100	470	176	99	22	332	1320	2200	16.3	33.7	25.6	10.2	345	6.34
			1250																									
Voisin L.A.P.	Voi. 8Bn2	Peugeot 8Aa	220	75	73	66	.....	17 20	32 20	66	...	14,100	4	2 Supp. lat.	10–264 4–340	1210	462	352	110	66	220	2900	4100	18.7	61.6	36.1	11.5	680	6.14
			2050	2050	2040	2030																						
Voisin	Voi. 10Bn2	Renault 12Fcx	300	78	76	71.5	.....	14 30	26 50	50	...	.....	2 40	2 Supp. lat.	10–264 4–340	1210	462	352	110	66	220	2900	4100	18.7	61.6	36.1	11.5	680	6.14
			1600	1520	1500	1480																						
Chasers																												
Morane	MoS A1C1	Gnome (stock)	160	129	126	121	.....	4 55	8 05	12 20	...	23,000	1 45	Vick. front	....	500	220	176	88	17.6	.....	924	1425	.....	27.9	18.55	7.90	145	10.2
			1400	1385	1360	1330																						
Nieuport (160 sq. ft.).	Nie. 24.27 C.	Rhone 9Jb	130	106	104.5	103	.....	5 40	9 25	14 40	21 30	22,700	1 15	Vick. front	....	423	147½	176	88	11	.....	782	1200	9.25	26.9	21	7.90	160	7.47
			1280	1280	1260	1240																						
Nieuport, ⅓ dihedral.	Nie. 28C	Gnome 9N	160	123	121.5	119	115	5 30	9	14	21 15	22,300	1 45	Vick. front	....	500	220	176	88	17.6	.....	880	1380	.....	26.3	20.5	7.55	172	8.10
			1400	1390	1380	1350	1310																					

Spad (195 sq. ft.)	Spa. 7C1	Hispano 8Aa	175	119.5	111.5	108	.....	6 40	11 30	19 30	...	18,000	2 10	Vick. front	....	451	176	176	88	11	.....	1100	1550	9.04	25.7	20	7.20	195	8.08
			1700	1720	1680	1640																							
Spad (195 sq.ft.)	Spa. 7C1	Hispano 8Ab	205	132	126	124.5	116	4 40	8 10	12 40	...	21,400	1 30	Vick. front	....	451	176	176	88	11	.....	1100	1550	9.04	25.7	20	7.20	195	8.08
			1800	1870	1830	1780	1710																						
Spad* (2-machine gun)	Spa. 13C1	Hispano 8Ba	220	130	128	125	118	5 17	8 45	13 5	20	22,300	2	Vick. front	....	556	242	176	132	11	.....	1255	1815	8.25	26.3	20.35	7.55	215	8.42
			2150	2180	2170	2130	2050																						
Spad* (2-machine gun)	Spa. 13C1	Hispano 8BEc	235	135	134	130.5	123	4 40	8	12 20	18 35	22,300	1 40	Vick. front	....	556	242	176	132	11	.....	1255	1815	8.25	26.3	20.35	7.55	215	8.42
			2150	2080	2060	2020	1950																						
Spad Cannon*	Spa. 12Ca1	Hispano 8C	220	.....	.....	.....	.....	...	...	...	...	.....	.....	Vick. front 1½" Cannon	....	.....	.....	176	191	28.6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
			2150																										
Breguet Cannon	Bre. 5Ca2	Renault 12Fb	265	84	78.5	.....	.....	15 30	...	...	...	14,100	.....	1½" Cannon Supp. above	....	1190	462	352	220	44	110	3087	4260	16.05	57.8	32.5	12.8	632	6.74
			1400	1350	1350																								
Voisin Cannon	Voi. 8Ca2	Peugeot 8Aa	220	75	73	66	.....	17 20	32 20	66	...	14,100	2 45	Supp. above	....	2110	313	352	414	22	110	2890	4100	18.7	61.6	36.1	11.5	680	6.14
			2050	2050	2010	2030																							

*These types are the only extensively used and supplied to the squadrons. The other types are still figuring in some squadrons but are no more supplied.

French Airplanes Under Test

Airplanes		Engines		Speed on the Level in M.P.H.				Duration of Climb				Theoretical Ceiling, Ft.	Hours of Flying Under Full Power at Ground Level	Armament		Total Load, Lb.	Division of Load					Weight Empty, Lb.	Total Weight in Flying Order, Lb.	Load per H.P., Lb.	Span, Ft.	Length, Ft.	Height, Ft.	Total Surface, Sq. Ft.	Load per Sq. Ft., Lb.
Make	Type	Make and Type	Maximum Power Permitted	At 6500 Ft.	At 9800 Ft.	At 13,100 Ft.	At 16,400 Ft.	To 6500 Ft.	To 9800 Ft.	To 13,100 Ft.	To 16,400 Ft.			Machine Guns with Mountings	Bomb Carriers Provided for Dropping:		Fuel and Oil, Lb.	Crew, Lb.	Armament, Lb.	Miscellaneous, Lb.	Bombs, Lb.							
Army Planes								M. S.	M. S.	M. S.	M. S.		H. M.																
Breguet	Bre. 14A2	Fiat A12	275	110.6	173	103.3	97	9 25	15 50	23 50	37 50	20,350	3	Vick. front Turr. rear	14–44	1158	476	352	198	132	.....	.....	.....	.....	46	29.2	10.8	560	.....
			1500	1580	1570	1520	1470																						
Breguet	Bre. 14A2	Lorraine 12D	370	122	118.7	115	107.6	5 20	8 50	13	19 20	23,000	..	.....	....	1158	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
			1650	1750	1730	1700	1650																						
Breguet	Bre. 14A2	Renault 12K	400	126.4	123	119.5	113.2	6 09	10 19	15 40	22 28	23,000	3 40	Vick. front Turr. rear	....	1442	684	352	220	187	.....	2,640	4,090	10.13	46	29.2	10.8	528	7.57
			1600	1595	1575	1560	1540																						
Salmson Armored	Sal. 4Ab2	Salmson 9Zm	260	89.4	85	.....	.....	20 14	43 27	...	...	12,140	2	Vick. front Turr. rear M. gun below	....	1155	320	352	308	176	.....	3,100	4,260	16.40	50	28.9	9.7	533	8.04
			1650	1690	1660																								
Bombing Planes																													
Voisin Triplane/ab	Voi. 28Bn4	4 Hispano 8Be	215	79.6	...	.....	.....	27	...	...	...	11,500	2 50	1.85 in. gun	As desired	4400	1320	880	330	220	1650	11,000	15,400	17.95	118.5	78	18.9	2150	7.1
			2150	2150																									
Caudron C22	Cau. 22Bn2	2 Rhone 9Jb	130	98.3	88	*	.....	11	21	*	...	11,150	3 30	M. gun rear	6–264 3–342	1980	550	352	88	66	837	2,070	4,050	15.65	54	27.2	8.25	536	7.57
			1280	1290	1250																								
Caudron C23	.....	2 CH 9Z	260	.....	.....	.....	.....	...	...	...	...	..	..	.....	....	.....	.....	.....	.....	.....	1540	.....	.....	.....	.....	.....	.....	.....	.....
*Speed with 154	0 lb. Climb	with 1980 lb.	2x 1650																										
Chasers																													
Gourdou	C1	Hispano 8Ab	200	147.5	.....	.....	.....	4 58	8 15	12 42	...	20,500	1 30	2 Vick front	†	430	160	176	172	17.6	†	1,320	1,750	8.8	29.5	21.6	7.54	179	9.82
			1800	1980																									
Nieuport	Nie. 28C1	Rhone 9R	170	125	123 8	121.3	117	4 30	7 40	12	...	20,700	2 15	1 Vick. front	....	511	228	176	88	17.6	.....	880	1,390	7.38	26.3	20.2	7.54	172	8.08
			1400	1410	1400	1380	1360																						
Nieuport Monocoque	.....	Rhone 9R	170	123	121.3	118.2	114	4 20	7 20	11 40	17 25	22,000	2 15	1 Vick. front	....	516	234	176	88	17.6	.....	.....	.....	.....	.....	.....	.....	.....	.....
			1400	1440	1430	1415	1385																						
Hanriot	H.D. 1C1	Rhone 9Jb	130	.....	.....	.....	.....	5 31	9 17	14 08	20 50	23,600	..	.....	....	452	.....	.....	.....	.....	.....	898	1,360	10.4	27.6	19.5	8.10	192	7.06
			1280																										
Morane Parasol	MoS A1C1	Rhone 9R	170	133.7	131.8	128	119.5	4 30	7 45	11 40	16 30	23,000	2 10	1 Vick. front	....	511	234	176	88	17.6	.....	916	1,440	8.5	27.9	18.5	7.86	145	9.92
			1400	1405	1390	1365	1310																						
Rep	C1	Salmson 9Z	260	133.7	131.8	128.7	122	5 30	9 23	14 39	23 28	19,700	2	2 Vick. front	....	683	313	176	176	17.6	.....	1,450	2,130	7.7	27.6	20.8	8.24	221	9.52
			1550	1705	1700	1670	1610																						
Vickers	Vic. 16C1	Lorraine 8Bd	275	.....	133.7	129	121.4	4 49	7 58	11 38	16 18	23,800	2 10	2 Vick. front	....	738	368	176	176	17.6	.....	.....	.....	.....	.....	.....	.....	.....	.....
			1700		1750	1730	1700																						
Hanriot-Dupont	H.D. 3C2	Salmson 9Za	260	128.7	126.3	122	116.5	6 39	11 04	17 09	25 34	22,000	2	Vick. front Turr. rear	....	940	275	352	302	11	.....	1,564	2,505	9.9	30.1	22.8	9.84	269	9.10
			1550	1640	1620	1590	1560																						
Vickers	C2	Lorraine 8Bd	285	.....	.....	.....	.....	6 15	10 40	16 20	26 50	20,350	2 15	Vick. front Turr. rear	....	967	386	352	198	11	.....	1,695	2,640	9.25	35.45	26.2	8.70	356	7.47
			1700																										
Sea	Sea. 4C2	Lorraine 12D	390	.....	.....	.....	.....	6 22	10 29	15 06	22 41	23,000	2	Vick. front Turr. rear	....	1210	507	352	297	55	.....	2,180	3,390	8.7	39.4	27.9	9.84	404	8.40
			1650																										

† The total load of the Gourdou plane has been reduced to take account of the lightening provided by the manufacturer from 512 to 428 lb.

Officially Recognized Perform and Sea

With a Few Conspicuous Examples of Achievements Authentic, Have Not Been

THE airplane records which are tabulated on these two pages and the one following are those that have been compiled by the Aero Club of America. But while they are the recognized records of airplane performance and cover flights which have been officially observed and recorded both in the United States and in foreign countries, they do not by any means represent some of the more recent achievements of foreign and American pilots.

Obviously, the war has precluded the possibility of publishing specific information regarding the accomplishments of military aviators and machines. Nevertheless, authentic reports from outside sources reveal that many of the records on these pages are, in fact, records no more. When the final data are collected, checked and officially promulgated in the form of records, it likely will be found that at least half of the figures given herewith have been superseded.

In the meantime, a brief review of some of the more conspicuous performances will serve to show how extensive may be the changes in the records. For example, the American altitude record for seaplanes is given as 875 ft. in a plane carrying six persons. As a matter of fact, this record is beaten nearly every day by regular navy fliers who commonly attain altitudes of more than 3000 ft., carrying as many as 11 persons.

In the matter of distance and passenger carrying, it probably will be a long time before the recent record of the navy seaplane NC1 is approached, yet it is not officially chronicled. This plane flew from Hampton Roads to Rockaway Beach, N. Y., carrying 51 passengers.

Another record about which nothing has become public was a flight of three navy seaplanes completely across the continent. Three stock machines were assembled, and almost without preparation flown from the Atlantic to the Pacific by regular navy pilots.

The altitude record, too, has been broken since these figures were compiled. Whereas Capt. Schroeder in September reached an altitude of 28,500 ft., a British pilot on Jan. 2 drove an American plane carrying himself and an observer to an altitude of 30,500 ft. in 55 min. 15 sec.

Speed records, as well, have been bet-

World's Records

SPEED

Time for a Given Distance

Kilometer	Miles	Aviator	Pass.	Place	Date	Machine	Motor	Time
5	3.11	Vedrines	0	Clearing, Ill.	Sept. 9, 1912	Deperdussin	Gnome-140	0: 1:43.38
10	6.21	Vedrines	0	Clearing, Ill.	Sept. 9, 1912	Deperdussin	Gnome-140	0: 3:27.87
15	9.32	Vedrines.	0	Clearing, Ill.	Sept. 9, 1912	Deperdussin	Gnome-140	0: 5:11.58
20	12.42	Vedrines	0	Clearing, Ill	Sept. 9, 1912	Deperdussin	Gnome-140	0: 6:55.95
30	18.64	Vedrines	0	Clearing, Ill.	Sept. 9, 1912	Deperdussin	Gnome-140	0:10:32.51
40	24.85	Vedrines	0	Clearing, Ill.	Sept. 9, 1912	Deperdussin	Gnome-140	0:14:03.59
50	31.06	Vedrines	0	Clearing, Ill.	Sept. 9, 1912	Deperdussin	Gnome-140	0:17:34.88
100	62.13	Vedrines	0	Clearing, Ill.	Sept. 9, 1912	Deperdussin	Gnome-140	0:35:16.65
150	93.20	Vedrines	0	Clearing, Ill.	Sept. 9, 1912	Deperdussin	Gnome-140	0:53:04.73
200	124.27	Vedrines	0	Clearing, Ill.	Sept. 9, 1912	Deperdussin	Gnome-140	1:10:56.65
250	155.34	Johnstone	0	Mineola, N. Y.	July 27, 1911	Moisant	Gnome-50	3:32:56.80
10	6.21	Grahame-White	1	Nassau Blvd., N. Y.	Sept. 30, 1911	Nieuport	Gnome-70	0: 6:13.40
20	12.42	Grahame-White	1	Nassau Blvd., N. Y.	Sept. 30, 1911	Nieuport	Gnome-70	0:12:26.60
30	18.64	Grahame-White	1	Nassau Blvd., N. Y.	Sept. 30, 1911	Nieuport	Gnome-70	0:18:42.00
40	24.85	Grahame-White	1	Nassau Blvd., N. Y.	Sept. 30, 1911	Nieuport	Gnome-70	0:24:49.80
50	31.06	Grahame-White	1	Nassau Blvd., N. Y.	Sept. 30, 1911	Nieuport	Gnome-70	0:31:01.60
5	3.10	Sopwith	2	Chicago, Ill.	Aug. 15, 1911	Wright	Wright-30	0: 6:56.40

Distance for a Given Time

40	24.85	Vedrines	0	Chicago, Ill.	Sept. 9, 1912	Deperdussin	Gnome-140	0:15:00.00
80	49.70	Vedrines	0	Chicago, Ill.	Sept. 9, 1912	Deperdussin	Gnome-140	0:30:00.00
166.6	103.50	Vedrines	0	Chicago, Ill.	Sept. 9, 1912	Deperdussin	Gnome-140	1:00:00.00
141.9	88.20	Johnstone	0	Mineola, N. Y.	July 27, 1911	Moisant	Gnome-50	2:00:00.00
214.6	133.20	Johnstone	0	Mineola, N. Y.	July 27, 1911	Moisant	Gnome-50	3:00:00.00
283.6	176.20	Johnstone	0	Mineola, N. Y.	July 27, 1911	Moisant	Gnome-50	4:00:00.00
24.14	15.00	Grahame-White	1	Squantum, Mass.	Sept. 4, 1911	Nieuport	Gnome-70	0:15:00.00
36.24	30.00	Grahame-White	1	Nassau Blvd., N. Y.	Sept. 30, 1911	Nieuport	Gnome-70	0:30:00.00

Maximum Speed Irrespective of Length of Flight

								Speed per Hour Kilo	Miles
....	....	Vedrines	0	Chicago, Ill.	Sept. 9, 1912	Deperdussin	Gnome-140	174.1	108.1
....	....	Grahame-White	1	Squantum, Mass.	Sept. 4, 1911	Nieuport	Gnome-70	101.7	63.2
....	....	Sopwith	2	Chicago, Ill.	Aug. 15, 1911	Wright	Wright-30	56.2	34.9

DISTANCE

....	....	W. C. Robinson	0	Des Moines, Iowa, to Kentland, Ind.	Oct. 17, 1914	Parasol type	Robinson	535.0	332.0

DISTANCE—Closed Circuit

....	....	T. C. Macaulay	5	Newport News, Va., to Pt. Lookout and return.	May 4, 1916	Curtiss	Curtiss	173.7	154.0

DURATION

								Time
....	....	Lt. B. Q. Jones	0	San Diego	Jan. 15, 1915	.....	.....	8:53:00
....	....	Lt. T. F. Dodd	1	San Diego to Burbank, Cal.	Feb. 14, 1914	Burgess	Renault-70	4:43:00
....	....	Lt. B. Q. Jones	2	San Diego	Mar. 12, 1915	.....	.....	7:05:00

ALTITUDE

								Feet
....	....	Capt. R. W. Schroeder	0	Fairfield, Ohio	Sept. 18, 1918	Bristol	Hispano-Suiza 300	28,900
....	....	V. Carlstrom	1	Newport News	April 30, 1916	Curtiss	Curtiss-OX	16,225
....	....	V. Carlstrom	2	Newport News	April 10, 1916	Curtiss	Curtiss-OX	11,180
....	....	R. V. Morris	3	Buffalo	Aug. 10, 1915	.....	.....	8,105

ance Records of Airplanes planes

of Military Aviators and Machines, Which, Though Promulgated As Records

World's Records

CLIMBING

Kilometer	Miles	Aviator	Pass.	Place	Date	Machine	Motor	Ft.	Time
									Time
....	....	R. Simon	0	Chicago, Ill.	Aug. 19, 1911	Bleriot	Gnome-50	1640	3:35:00
....	....	Sopwith	0	Chicago, Ill.	Aug. 19, 1911	Sopwith	Gnome-70	1640	3:35:00
....	....	Grahame-White	1	Nassau Blvd., N. Y.	Sept. 30, 1911	Nieuport	Gnome-70	3280	9:00:00

ALIGHTING

								Distance from Mark
....	....	Sopwith	0	Nassau Blvd., N. Y.	July 22, 1911	Wright	E.M.V. 60	1 ft. 5½ in.

WEIGHT CARRYING

								Weight, Lb.
....	....	P. O. Parmelee	0	Chicago, Ill.	Aug. 19, 1911	Wright	Wright-30	458

CROSS COUNTRY

								Distance Miles
....	....	Stinson	0	Chicago to Binghamton	May 23, 1918	Curtiss	Curtiss	601.7
....	....	V. Carlstrom	1	Newport News to Sheepshead Bay	May 23, 1918	Curtiss	Curtiss-OX	283.0

DURATION

								Time
....	....	Stinson	0	Chicago to Binghamton	May 23, 1918	Curtiss	Curtiss	10:10:00
....	....	Lt. T. F. Dodd	1	San Diego to Burbank, Cal.	Feb. 14, 1914	Burgess	Gnome-70	4:43:00

HYDROAIRPLANE

Distance

								Miles
....	....	L. B. Sperry	1	Brooklyn, N. Y., to Ossining, N. Y., and return.	Jan. 20, 1915	Curtiss	.....	60
....	....	A. G. Sutro	2	San Francisco	Sept. 28, 1913	Sutro	.....	33.5
....	....	T. C. Macaulay	4	Newport News to Baltimore.	May 6, 1916	.....	.....	178.3

DURATION

								Time
....	....	L. V. Sperry	1	Brooklyn to Ossining and return.	Jan. 20, 1915	Curtiss	.....	1:25:00
....	....	T. C. Macaulay	4	Newport News to Baltimore.	May 16, 1916	.....	.....	3:01:00
....	....	A. G. Sutro	2	San Francisco	Sept. 28, 1913	Sutro	.....	1:15:35

ALTITUDE

								Feet
....	....	Lt. R. C. Saufley	0	Pensacola	Mar. 29, 1916	Curtiss	.....	16,010
....	....	Caleb Bragg	1	Pt. Washington	Sept. 19, 1917	Wright-Martin FBA	.....	13,950
....	....	Caleb Bragg	2	Pt. Washington	Aug. 25, 1917	Wright-Martin FBA	.....	12,900
....	....	Floyd Smith	3	North Island, Cal.	Feb. 15, 1916	Martin	.... ..	9,603
....	....	T. C. Macaulay	5	Newport News	May 4, 1916	Curtiss	.....	775
....	....	T. C. Macaulay	6	Newport News	April 30, 1916	Curtiss	.....	875

tered time and again. There was a conspicuous example of this only last week when Major-General Kenly flew from Washington to New York to attend the dinner of the Manufacturers' Aircraft Association. He came over in a De Haviland, covering the 270 miles between the Capital and Mineola in 99 minutes, which figures out at an average of 163 m.p.h. Still more recently, Lieut. Springer flew a Martin bomber, the first to be turned out, from Dayton to Cleveland, carrying a passenger, at the rate of 172 m.p.h. And it was considered quite an accomplishment when S. F. Kettering flew more than a month ago from Dayton to New York in a De Haviland equipped with a Liberty engine in 4 hr. 10 min., averaging 140 m.p.h.

Cross country records have long since gone by the boards. Take the case of the four army airplanes which only last week reached Mineola after having flown all the way from San Diego. They were in the air 55 hours, all told, during the 34 days required for the journey.

And in the middle of December, came news from England that for the first time the flight between England and India had been accomplished. Major A. S. MacLaren made the flight with one passenger in a Handley-Page machine equipped with four Rolls-Royce Eagle engines, covering the distance in five legs.

It is believed by many that a large portion of long distance records of the future will be held by seaplanes or flying boats, this for the reason that as long as they are over water they are sure of a landing place and thus are enabled to venture further than land machines.

Two long flights in navy seaplanes have recently been completed, one from the Naval Air Station at Pensacola and the other from Norfolk, Va. Lieut. T. C. Rodman, U. S. Marine Corps, on Dec. 30 flew 900 miles from the Pensacola station, carrying eleven passengers. The same day Lieutenant-Commander Bollinger, U. S. N., covered a distance of 651 miles from the Norfolk station without stop, carrying five passengers.

These, of course, are only random examples, and may not represent the ultimate that has been attained in any of these fields. Doubtless some of even these astonishing performances have been beaten and the results withheld for military or other reasons.

(*Continued on following page*)

Recognized World Records of Airplane Performance

(*See article on pages* 138 *and* 139)

GREATEST SPEED

Closed Circuit Without Alighting

Hours	Aviator	Pass.	Country	Date	M.P.H. in Flight of 3.11 Miles
.....	M. Prevost	0	France	Sept. 29, 1913	126.7
.....	G. Legagneux	1	France	July 20, 1912	85.00
.....	E. Nieuport	2	France	July 20, 1912	63.9
.....	P. Mendelli	3	Austria	Aug. 16, 1912	66.00
.....	Garaix	4	France	June 10, 1914	69.00
.....	Garaix	5	France	June 10, 1914	67.25
.....	Garaix	6	France	April 22, 1914	66.70

DISTANCE

Closed Circuit Without Alighting

					Miles
.....	A. Senguin	0	France	Oct. 13, 1913	616.00
.....	E. Renaux	1	France	June 9, 1914	310.50
.....	H. Bier	2	Austria	Oct. 1, 1911	69.50
.....	Mendelli	3	Austria	Aug. 16, 1912	68.30
.....	Champel	4	France	April 15, 1913	155.20
.....	Garaix	5	France	June 10, 1914	93.10
.....	Garaix	6	France	April 22, 1914	68.30

DISTANCE

In a Straight Line Without Alighting

					Miles
.....	Deroye	0	Italy	July 17, 1913	506.80
.....	Garaix	6	France	April 22, 1914	63.80

TIME

Closed Circuit Without Alighting

					Miles
¼	M. Prevost	0	France	Sept. 29, 1913	31.06
½	M. Prevost	0	France	Sept. 29, 1913	62.13
1	M. Prevost	0	France	Sept. 29, 1913	124.36
2	J. Vedrines	0	France	Jan. 9, 1913	153.30
3	M. Tabuteau	0	France	Jan. 24, 1912	192.50
4	Gilbert	0	France	Dec. 30, 1912	249.60
5	Gilbert	0	France	Dec. 30, 1912	316.70
6	Bourcique	0	France	Dec. 31, 1910	304.20
7	M. Tabuteau	0	France	Dec. 30, 1910	324.70
8	Fourny	0	France	Sept. 11, 1912	357.20
9	Fourny	0	France	Sept. 11, 1912	410.40
10	Fourny	0	France	Sept. 11, 1912	462.60
11	Fourny	0	France	Sept. 11, 1912	509.20
12	Fourny	0	France	Sept. 11, 1912	561.30
13	Fourny	0	France	Sept. 11, 1912	608.50
¼	Gleagneux	1	France	July 5, 1912	19.20
½	Gleagneux	1	France	July 5, 1912	41.30
1	Gleagneux	1	France	July 5, 1912	82.80
2	Erenaux	1	France	June 9, 1914	131.40
3	Erenaux	1	France	June 9, 1914	186.10
4	Erenaux	1	France	June 9, 1914	262.00
1	Mendelli	3	Austria	Aug. 16, 1912	65.80
¼	Garaix	4	France	June 10, 1914	16.40
½	Garaix	4	France	June 10, 1914	32.90
1	Garaix	4	France	June 10, 1914	66.40
2	Champel	4	France	April 15, 1913	101.80
3	Champel	4	France	April 15, 1913	153.30
¼	Garaix	6	France	April 22, 1914	12.40
½	Garaix	6	France	April 22, 1914	31.00
1	Garaix	6	France	April 22, 1914	64.50

DURATION

Closed Circuit Without Alighting

					H.	M.	Sec.
.....	W. Landman	0	Germany	June 26-7, 1914	21	48	45.0
.....	Gaubert	1	France	Aug. 30, 1913	6	42	49.6
.....	Lt. B. Q. Jones	2	United States	.....	7	5	00.0
.....	Garaix	3	France	July 2, 1914	4	3	39.8
.....	Champel	4	France	April 15, 1913	3	1	17.0
.....	Garaix	5	France	June 10, 1914	1	24	11.2
.....	Garaix	6	France	April 22, 1914	1	2	25.6
.....	L. Noel	7	Great Britain	April 22, 1913	0	17	25.4
.....	Frants	8	France	Mar. 2, 1913	0	11	28.4
.....	L. Noel	9	Great Britain	Oct. 2, 1913	0	19	47.0

ALTITUDE

					Feet
.....	Capt. N. W. Schroeder	0	United States	Sept. 18, 1918	28,900
.....	H. Bier	1	Austria	June 27, 1914	20,237
.....	H. Bier	2	Austria	June 28, 1914	17,843
.....	E. V. Losse	3	Austria	June 27, 1914	15 715
.....	Garaix	4	France	Feb. 25, 1914	10,004
.....	Garaix	5	France	Feb. 4, 1914	7,314
.....	Garaix	6	France	Jan. 31, 1914	5,740
.....	Garaix	7	France	Mar. 17, 1914	5,248
.....	Garaix	8	France	Mar. 28, 1914	5,018
.....	Garaix	9	France	Mar. 30, 1914	5,215
.....	Sykorsky	15	Russia	April 25, 1914	984

SPEED

Closed Circuit Without Alighting

Aviator Only

Kilometers	Miles	Aviator	Country	Date	Time H.	M.	Sec.
5	3.11	J. Vedrines	United States	Sept. 9, 1912	0	1	43.4
10	6.21	M. Prevost	France	Sept. 29, 1913	0	2	56.6
20	12.42	M. Prevost	France	Sept. 29, 1913	0	5	54.2
30	18.64	M. Prevost	France	Sept. 29, 1913	0	8	52.2
40	24.85	M. Prevost	France	Sept. 29, 1913	0	11	50.2
50	31.06	M. Prevost	France	Sept. 29, 1913	0	14	48.2
100	62.13	M. Prevost	France	Sept. 29, 1913	0	29	40.0
150	93.20	M. Prevost	France	Sept. 29, 1913	0	44	38.0
200	124.26	M. Prevost	France	Sept. 20, 1913	0	59	45.6
250	155.34	J. Vedrines	France	Jan. 9, 1913	2	1	53.6
300	186.39	Gobioni	Italy	Mar. 28, 1912	2	49	00.0
350	217.45	Gilbert	France	Dec. 30, 1912	3	26	16.0
400	248.12	Gilbert	France	Dec. 30, 1812	3	55	27.6
450	279.58	Gilbert	France	Dec. 30, 1912	4	24	44.8
500	310.60	Gilbert	France	Dec. 30, 1912	4	54	6.2
600	372.43	Gilbert	France	Dec. 30, 1912	5	52	38.0
700	434.70	Fourny	France	Sept. 11, 1912	9	31	1.0
800	496.83	Fourny	France	Sept. 11, 1912	10	44	45.8
900	548.96	Fourny	France	Sept. 11, 1912	11	59	9.6
1000	621.09	Fourny	France	Sept. 11, 1912	13	1	12.0

Aviator and One Passenger

5	3.11	H. Bier	Austria	Oct. 1, 1912	0	2	58.0
10	6.21	G. Legagneux	France	July 20, 1912	0	4	24.8
20	12.42	G. Legagneux	France	July 20, 1912	1	8	51.0
30	18.64	G. Legagneux	France	July 20, 1912	0	13	18.6
40	24.85	G. Legagneux	France	July 20, 1912	0	17	44.8
50	31.06	G. Legagneux	France	July 20, 1912	0	23	13.0
100	62.13	G. Legagneux	France	July 20, 1912	0	34	36.6
150	93.20	G. Legagneux	France	July 20, 1912	1	7	10.0
200	124.26	E. Renaux	France	June 9, 1914	1	53	40.0
250	155.34	E. Renaux	France	June 9, 1914	2	21	56.0
300	186.39	E. Renaux	France	June 9, 1914	2	50	28.0
350	217.45	E. Renaux	France	June 9, 1914	3	18	44.2
400	248.12	E. Renaux	France	June 9, 1914	3	47	17.0
450	279.58	E. Renaux	France	June 9, 1914	4	15	29.4
500	310.60	E. Renaux	France	June 9, 1914	4	43	16.0

Aviator and Two Passengers

5	3.11	C. Nieuport	Austria	June 30, 1912	0	2	52.0
10	6.21	C. Nieuport	Austria	June 30, 1912	0	5	45.0
20	12.42	E. Nieuport	France	Mar. 9, 1911	0	11	59.6
30	18.64	E. Nieuport	France	Mar. 9, 1911	0	17	52.6
40	24.85	E. Nieuport	France	Mar. 9, 1911	0	22	44.4
50	31.06	E. Nieuport	France	Mar. 9, 1911	0	29	37.4
100	62.13	E. Nieuport	France	Mar. 9, 1911	0	59	8.0

Aviator and Three Passengers

5	3.11	P. Mendelli	Austria	Aug. 16, 1912	0	3	48.0
10	6.21	G. Busson	France	Mar. 10, 1911	0	6	16.0
20	12.42	P. Mendelli	Austria	Mar. 16, 1912	0	12	3.0
30	18.64	P. Mendelli	Austria	Aug. 16, 1912	0	17	37.0
40	24.85	P. Mendelli	Austria	Aug. 16, 1912	0	23	11.0
50	31.06	P. Mendelli	Austria	Aug. 16, 1912	0	29	47.0
100	62.13	P. Mendelli	Austria	Aug. 16, 1912	0	56	33.0

Aviator and Four Passengers

5	3.11	G. Busson	France	Mar. 10, 1911	0	3	34.0
10	6.21	Garaix	France	June 10, 1914	0	5	27.4
20	12.42	Garaix	France	June 10, 1914	0	11	0.2
30	18.64	Garaix	France	June 10, 1914	0	16	32.6
40	24.85	Garaix	France	June 10, 1914	0	22	1.8
50	31.06	Garaix	France	June 10, 1914	0	27	32.8
100	62.13	Garaix	France	June 10, 1914	0	55	12.8
150	93.20	Champel	France	April 15, 1913	1	49	11.8
200	124.26	Champel	France	April 15, 1913	2	25	2.2
250	155.34	Champel	France	April 15, 1913	3	1	17.0

Aviator and Five Passengers

10	6.21	Garaix	France	June 10, 1914	0	5	32.4
20	12.42	Garaix	France	June 10, 1914	0	11	5.4
30	18.64	Garaix	France	June 10, 1914	0	16	39.4
40	24.85	Garaix	France	June 10, 1914	0	22	14.0
50	31.06	Garaix	France	June 10, 1914	0	27	47.4
100	62.13	Garaix	France	June 10, 1914	0	56	20.2
150	93.20	Garaix	France	June 10, 1914	1	24	11.2

Aviator and Six Passengers

10	6.21	Garaix	France	April 22, 1914	0	5	35.0
20	12.42	Garaix	France	April 22, 1914	0	11	12.2
30	18.64	Garaix	France	April 22, 1914	0	16	48.8
40	24.85	Garaix	France	April 22, 1914	0	22	28.2
50	31.06	Garaix	France	April 22, 1914	0	28	5.4
100	62.13	Garaix	France	April 22, 1914	0	56	44.0

Comparative Chart of Airplanes in the Italian Service.

Airplanes		Engines		Speeds		Duration of Climb				Ceiling, Calc.	Endurance at G. L. at Max. R.P.M.		Crew	Armament, Guns and Mountings	Total Load	Components of Total Load					Weights			Span, Ft.	Length, Ft.	Height, Ft.	Total Surface, Sq. Ft.	Load per Sq. Ft.
Name	Type	Type	Normal H.P.	Ground Level, Speed, M.P.H.	6500 Ft. (2000 M.), Speed, M.P.H.	To 3280 Ft. (1000 M)	To 6500 Ft. (2000 M.)	To 10,000 Ft. (3000 M.)	To 13,000 Ft. (4000 M.)		Air					Petrol and Oil	Crew	Armt. & Ammun.	Misc.	Bombs	Empty	In Flying Trim	Per H.P.					
						m. s.	m. s.	m. s.	m. s.		h.m.																	
MACHINES ATTACHED TO ARMY CORPS:																												
Aviatik		Salmson	143	71.5	.....	8	18	40	.....	.....	3	30	2	1 M.G.	726	308	330	66	22	....	1540	2266	15.9	39.4	25.6	10.2	430	5.27
Caudron[1]	G.3.	Le Rhone	88	68.0	.....	7	16	32	55	19,000	4	0	2	.....	627	275	330	...	22	....	979	1606	18.3	43.4	23.3	8.4	290	5.54
Caudron[1]	G.4.	2 Le Rhone	176	83.0	.....	5	11	20	36	26,000	4	30	2	1 M.G.	1100	616	330	66	88	....	1870	2970	16.8	55.4	24.0	8.54	430	6.97
Farman	14.	Fiat A.10	110	67.0	.....	10	24	45	75	15,000	4	0	2	1 M.G.	638	242	330	66	..	....	1408	2046	18.6	53.2	31.2	10.5	602	3.38
Farman Colombo... With	.....	Colombo with Ova Booms	120	74.5	.....	7	16	26	50	.....	4	0	2	1 M.G.	638	242	330	66	..	....	1408	2046	17.05	53.2	31.2	10.5	602	3.38
Voisin	.....	Salmson	143	65.0	.....	10	23	45	.....	.....	3	30	2	1 M.G.	792	374	330	66	22	....	1760	2552	17.8	48.4	31.2	9.7	580	4.4
Voisin	.....	I.F. v.4.8.	190	71.5	.....	8	18	35	.....	19,500	4	0	2	1 M.G.	770	374	330	66	..	....	1980	2750	14.5	48.4	31.2	9.7	580	4.75
RECONNAISSANCE M/CS.																												
Pomilio[2]	C.1.	Fiat A.12 Type D	270	114	110.5	5 27	12 36	22 1	37	.....	3	0	2	2 M.G.	880	440	330	110	..	....	2589.4	3469.4	12.9	36.4	30.8	9.85	495	7.05
Savoia Pomilio	2.	Fiat A.12	270	84.0	.....	6 30	18 0	28 0	46 0	.....	4	0	2	1 M.G.	990	495	330	55	..	110	2750	3740	13.9	55.0	35.2	11.7	720	5.21
Savoia Pomilio... (Light Structure)	.....	Fiat A.12	270	91.5	91.0	4 50	12 0	21 30	36 0	.....	4	0	2	1 M.G.	990	495	330	55	..	110	2310	3300	12.2	48.3	35.2	11.7	645	5.13
Savoia Pomilio... (Twin Engines)	.....	2 I.F.v.4.B.	380	91.5	.....	5 45	13 0	23 30	42 30	.....	4	0	3	2 M.G.	1540	759	495	176	..	110	3520	5060	13.3	65.0	35.2	11.7	840	6.05
S.A.M.L. with large wings[2]	.....	Fiat A.12	270	100	.....	5 44	12 18	21 6	36 24	.....	3	30	2	1 M.G.	924	440	330	66	..	88	2156	3080	11.4	45.3	27.9	9.7	484	6.37
S.A.M.L. with reduced wings[2]	.....	Fiat A.12	270	104.0	.....	5 41	12 6	21 37	30 45	.....	3	30	2	1 M.G	825	440	330	55	..	....	2112	2937	10.9	41.0	27.9	9.7	420	7.04
*S.I.A. (Reconnaissance)	7.B.	Fiat A.12	270	118	117.5	2 45	7 30	11 45	18 45	.....	4	0	2	2 M.G.	1100	495	330	110	33	132	2120.8	3220.8	11.9	43.8	30.4	9.85	516	6.25
*S.I.A. (Reconnaissance)	7.B.	Fiat A.12	270	.....	.....	.....	.....	.....	.....	21,000	....		2	.....	770	....	...	...	...	....	2120.8	2890.8	10.7	43.8	30.4	9.85	516	5.6
*S.I.A. (Reconnaissance)	7.B.	Fiat A.12	270	.....	.....	.....	.....	.....	.....	25,000	....		1	.....	550	....	...	...	...	....	2120.8	2670.8	9.9	43.8	30.4	9.85	516	5.2
BOMBERS:																												
*Caproni Biplane[3]	.....	3 Fiat A.12	810	90.6	.....	6 30	14 35	25	40	15,000	4	0	3	2 M.G.	3300	1452	495	110	55	1188	6600	9900	12.2	77.0	41.2	13.85	1420	7.0
*Caproni Triplane[4]	.....	3 I.F.v5.	810	77.6	73.6	19 41	51 25	.....	.....	9,400	7	0	5	4 M.G.	6600	2310	825	220	55	3190	8025.6	14625.6	18.1	101.9	49.3	21.4	2690	5.45
Caproni[5]	.....	3 Fiat A.10	330	73.5	.....	12 0	28 0	50 0	.....	.....	6	0	3	2 M.G.	2200	1100	495	110	55	440	4268	6468	19.6	73.4	35.8	12.6	1053	6.15
Caproni[6]	.....	2 Fiat I.F. A.10. v.4.B	410	81.0	.....	10 0	22 0	40 0	65 0	.....	5	30	3	2 M.G.	2200	1100	495	110	55	440	4378	6578	16.1	73.4	35.8	12.6	1053	6.25
Caproni[7]	.....	3 I.F. v.4.B.	570	86.0	.....	5 30	12 10	21 0	30 0	.....	4	0	3	2 M.G.	2200	1100	495	110	55	440	5060	7260	12.8	73.4	35.8	12.6	1053	6.9
*S.I.A. 9b	9.B.	Fiat A.14	700	134.0	130.2	4 30	10 0	18 0	26 45	1,650,000	3	0	2	2 M.G.	2442	770	330	110	11	1221	3938	6380	9.13	50.9	33.2	13.1	710	9.1
*S.P. 4	4	2 S.P.A.	460	93.2	91.4	3 0	8 15	14 0	.....	.....	4	0	3	2 M.G.	2200	792	495	110	22	781	3740	5940	12.9	65.0	35.2	11.66	839	7.1
*S.I.A.7.b. (Bomber)	7.B.	Fiat A.12	270	116.0	114.1	4 0	9 30	18 0	36 45	.....	4	0	2	2 M.G.	1760	572	330	110	22	726	2090	3850	14.3	43.8	30.4	9.85	516	7.46
FIGHTERS																												
*Hanriot-Dupont	.....	Le Rhone	110	113.0	109.1	2 10	5 10	8 30	13 10	.....	2	30	1	1 M.G.	396	176	165	55	.....	.....	869	1265	11.5	27.9	19.7	8.36	193.5	6.56
Nieuport One Seater	.....	Le Rhone	88	95.0	.....	5 0	11 8	18 37	27 40	22,000	2	30	1	1 M.G.	352	154	165	33	.....	.....	792	1144	13.0	24.45	18.3	8.9	140	8.2
Nieuport One Seater	.....	Le Rhone	110	102	100	3 15	6 30	11 30	.....	.....	2	30	1	1 M.G.	396	187	165	44	.....	.....	858	1254	11.4	26.95	18.4	7.7	161	7.8
Spad One Seater Flat Winged	.....	H.S.	140	123.5	120.5	2 00	5 50	9 50	.....	.....	2	00	1	1 M.G	451	231	165	55	.....	.....	1100	1551	11.0	25.8	20.0	7.2	192	8.1
*S.V.A. (Fighter)	.....	S.P.A.	230	143.5	.....	1 40	4 30	8 10	13 0	.....	2	30	1	2 M.G.	506	231	165	110	.....	.....	1496	2002	8.7	30.05	26.8	9.2	263.0	7.62
*S.V.A. (Escort)	.....	S.P.A.	230	143.0	.....	2 30	7 30	12 0	18 0	.....	5	0	1	2 M.G.	759	462	165	110	22	.....	1533.4	2292.4	10.0	30.05	26.8	9.2	263.0	8.7
*S.V.A. (Escort)	.....	S.P.A.	230	143.7	.....	2 10	5 30	10 15	15 15	.....	....		1	.....	495	....	...	...	...	....	1533.4	2292.4	10.0	30.5	26.8	9.2	263.0	8.7
HYDROPLANES																												
Lohner	1	I.F. v.4.B.	190	65.0	.....	13 0	13 0	.....	.....	.....	6	0	2	1 M.G.	1302.4	572	330	114.4	..	286	2530	3832.4	20.2	53.2	34.2	11.5	570	6.7
Lohner	2 (L.C.)	I.F.	190	87.0	.....	8 0	19 0	38 0	.....	.....	4	0	1	1 M.G.	990	440	330	66	22	132	2090	3080	16.3	53.2	34.8	10.4	516	6.0
Lohner[2]	3	I.F.	190	89.0	.....	6 58	16 17	29 11	57 30	.....	4	0	2	1 M.G.	990	440	330	66	22	132	1804	2794	14.75	52.4	33.6	10.5	495	5.65
F.B.A.	.....	Gnome-Mono	102	68.5	.....	7 30	17 0	40 0	.....	.....	4	0	1	1 M.G.	693	308	165	66	..	154	1265	1958	19.15	45.0	28.9	10.0	329	6.0
F.B.A.	.....	H.S.	140	86.0	.....	8 30	24 0	40 0	.....	15,000	4	0	2	1 M.G.	946	407	330	66	33	110	1782	2728	19.5	47.6	33.2	10.9	448	6.15
F.B.A.	.....	I.F. v.4.B.	190	90.0	.....	8 0	19 0	38 0	53 0	.....	4	0	2	1 M.G.	1045	440	330	66	33	176	2035	3080	16.2	47.6	33.2	11.1	448	6.86
Macchi One Seat Fighter	.....	I.F. v.4.B.	190	108.5	.....	3 45	8 45	14 0	22 0	.....	3	0	1	1 M.G.	572	275	165	55	33	44	1507	2079	10.9	39.4	27.2	9.85	301	6.9
*Sopwith	.....	Le Rhone	110	96.4	.....	5 0	12 0	25 0	.....	.....	3	0	1	1 M.G.	440	220	165	55	..	....	1056	1496	13.6	25.6	23.0	9.85	236.2	6.35

*Experimental machines. [1]Artillery destroyers. [2]Average of acceptance tests in August. [3]Six machine guns can be fitted. [4]Nine machine guns can be fitted. [5]The load of bombs can be increased by reducing the air endurance, which in practice will not exceed 5 hours. [6]Generally the air endurance is reduced, in order to increase the load of bombs. [7]The 16,500 ft. was attained with a load of 1,760 lbs. in 38 mins.

Developments in the Galician Oil Industry

INDUSTRY in general depends in so many ways upon the supply of mineral oil that every new development in the oil fields of Europe has an important bearing on the reconstruction of the industries of these countries. War requirements of lubricating oil for railway use made a greatly increased output from the wells of Galicia necessary. The effects of the increased demand continue, and in view of the possibly distant resumption of imports from the United States further efforts are being made to widen the available oil fields. A number of fresh borings have been started, and preparations are being made for others. Government help is afforded the prospectors by lending machinery and horses and by supplying them with wood and coal with a view to hastening the progress of the boring. The Galician wells yield an oil richer in the heavy constituents needed for a lubricating oil than those of the Boryslaw and Tustanovic districts, says the *Oesterreichische Chemiker- und Techniker-Zeitung.*

Tungsten Contact Points

IN a recent article in Electrotechnische Zeitschrift by H. v. Fleischbein, the author explains the general difficulties in making relay contacts, and the troubles met with even when using platinum, through dirt, burning or welding together of the contacts. A series of experiments has resulted in the construction of contacts of tungsten that are superior to contacts of platinum.

The main difficulty in using tungsten lies in the fixing of the tungsten to the supporting spring. This has been successfully overcome by a process of electric spot welding. Care has to be taken that the material of the spring does not overheat and allow the tungsten contact to be pushed through it. As tungsten is a poor conductor of electricity, the heating at the contacts is greater than with platinum, and on this account it is advisable to make the contacts as short as possible. Under certain circumstances artificial cooling must be resorted to.

British Airplanes

Principal Types of Engines and Air Service and

Engines Used by Royal Naval Air Service

(WAR AND SCHOOL USE)

Engine	Used in Aeroplane	Seaplane	Remarks
90 H.P. Anzani	Caudron (School)	.....	Early type radial engine used for school purposes.
150 H.P. A. R. 1	Bristol Mono.	A.D. Navy plane	Latest design Rotary engine. Only two in use at present.
120 H.P. Austro Daimler (Beardmore)	.....	W. & T. F. Boat	Chiefly used by R. F. C.
135 H.P. Canton Unne	Henry Farman	Short S.830	Water-cooled stationary radial, no further engines being ordered.
200 H.P. Canton Unne	.....	Short S.166	Water-cooled stationary radial, no further engines being ordered.
80 H.P. Clerget	Sopwith 9901 (Pup)	.....	Seven-cyl. It is understood that the manufacture of this engine is being stopped in favor of the 80 Rhone.
110 H.P. Clerget	Sopwith 9400 S	Sopwith Baby	9-cyl. Rotary; to be superseded by 130 H.P. Clerget.
110 H.P. Clerget	Sopwith 9400 L	.....	
110 H.P. Clerget	Sopwith 9700	.....	
110 H.P. Clerget	Sopwith Triplane	.....	
110 H.P. Clerget	Nieuport 2-Seater	.....	
130 H.P. Clerget	Sopwith F1	Hamble Baby	
130 H.P. Clerget	Nieuport 2-Seater	.....	
130 H.P. Clerget	Nieuport Single	.....	
130 H.P. Clerget	A. W. Quad	.....	9-cyl. Rotary, used largely by both services.
130 H.P. Clerget	Nieuport Triplane	.....	
130 H.P. Clerget	.....	Sonwith Imp Baby	
130 H.P. Clerget	.....	White Type 4	
90 H.P. Curtiss	B.E. 2.C.	.....	8-cyl. V water cooled; school use.
90 H.P. Curtiss	J.N. 3.	.....	
90 H.P. Curtiss	J.N. 4.	.....	
160 H.P. Curtiss	Curtiss R.2.	.....	8-cyl. V water cooled; being developed to give greater power and reliability, in America.
80 H.P. Gnome	Avro Scout	.....	7-cyl. Rotary chiefly used for school purposes.
80 H.P. Gnome	Avro 179 type	.....	
80 H.P. Gnome	Bristol Scout	.....	
100 H.P. Gnome Mono	Bristol Scout	Sopwith Baby	9-cyl. Rotary, not likely to be used for war purposes in future.
100 H.P. Gnome Mono	Avro Scout	Sonwith Schndr.	
100 H.P. Gnome Mono	.....	F.B.A.F. Boat	
100 H.P. Gnome Mono	.....	P.V. 2.	
150 H.P. Hispano	Spad	Maurice Farman	8-cyl. V water cooled; a modern type based on latest principles.
200 H.P. Hispano	.....	A.D.F. Boat	Similar engine to above but fitted with reduction gear to propeller.
90 H.P. R.A.F.	B.E.2.C.	.....	8-cyl. V air cooled, school purposes only
70-75 H.P. Renault	B.E.2.C.	.....	8-cyl. V air cooled, school purposes only.
70-80 H.P. Renault	M. Farman, long	.....	8-cyl. V air cooled, school purposes only.
70-80 H.P. Renault	M. Farman, short	.....	
150 H.P. Renault	Farman F.40	.....	8-cyl. V water cooled, comparatively few of these engines in service.
240 H.P. Renault	.....	Short 184	12-cyl. V water cooled, being used for two-seater seaplanes.
60 H.P. Rhone	G.W. 1600 type	.....	7-cyl. Rotary, school purposes only, being superseded by 80 H.P. Rhone.
80 H.P. Rhone	Sopwith 9901	.....	9-cyl. Rotary, school purposes and single seater fighters.
80 H.P. Rhone	Nieuport 1 seater	.....	
75 H.P. Rolls-Royce	B.E.2.E.	.....	6-cyl. vertical, water cooled, school purposes and small airships.
190 H.P. Rolls-Royce	De Havilland 4	A.D.F. Boat	12-cyl. V water cooled; now being developed to give 260 H.P.
190 H.P. Rolls-Royce	Fairey Fighter	Blackburn Twin	Two 190 H.P. engines in Fairey fighter and Blackburn Twin.
190 H.P. Rolls-Royce	.....	Fairey type 3	
250 H.P. Rolls-Royce	De Havilland 4	Large America	12-cyl. V water cooled; now being developed to 360 H.P. Two 250 H.P. engines in large America Three 250 H.P. engines in Porte Boat. Two 250 H.P. engines in Handley Page.
250 H.P. Rolls-Royce	Handley Page	Porte Boat	
250 H.P. Rolls-Royce	.....	Fairey Campania	
250 H.P. Rolls-Royce	.....	Wight Convert	
150 H.P. Sunbeam	.....	Avro Tractor	8-cyl. V water cooled. Now out of date.
		Short S.8.27	
200 H.P. Sunbeam	A.W. Biplane	.....	12-cyl. V water cooled; now being developed to give increased H.P.
200 H.P. Sunbeam	Parnall Night Flyer	.....	
200 H.P. Sunbeam	Sunbeam type 7	.....	
225 H.P. Sunbeam	.....	Short 184	
		Short 184 single bomber	12-cyl. V water cooled; out of date.
240 H.P. Sunbeam	.....	Short 184	12-cyl. V water cooled; will be superseded by later Sunbeam
		Short 184 single bomber	
320 H.P. Sunbeam	H.P. Triplane	Short 320 H.P.	12-cyl. V water cooled; used in large 2-seater seaplane.
		Cruiser Seaplane	Two 320 H.P. engines in cruiser seaplanes.

The above table contains the first published list of all engines used by the British Navy in airplanes and seaplanes and seems to be arranged on a chronological basis. This is indicated by the fact that the Austro-Daimler engine, which had been adopted in England previous to the war, appears high up in the list. In the early part of the war the British Navy seems to have pinned its faith mainly to rotary types of engines, while later the V type engine came to the front

Airplanes in Use in Royal Naval Air Service

(*NOT* INCLUDING EXPERIMENTAL TYPES)

Machine	Engine	Duty
Avro.	80 Gnome.	Both 2-seater and single-seater, used exclusively for school (training) work.
B.E. 2.	75/80 H.P. Renault.	Two-seater tractor, used as a training machine, also as a night flyer for home defense against Zepps. A few also still used for reconnaissance patrol in the Eastern Mediterranean.
-c, d, & e.	90 H.P. R.A.F.	
Bristol Scout.	80 & 100 H.P. Gnome.	Originally used as fast single-seater fighter. Now becoming out of date, and only used for advanced training purposes.
Caudron.	100 Anzani & 80 Gnome.	Two-seater tractor. Used only as school machine.
Curtiss J.N. 3 & J.N. 4.	90 H.P. Curtiss.	Two-seater tractor. Supplied from America as a "reconnaissance machine." Only used for training purposes in this country.
Curtiss R.2.	160 Curtiss being replaced in this country by 200 Sunbeam.	Two-seater tractor. Has a good performance and carries a useful load of bombs. On completion of alteration of engine may be used on active service for bombing raids.
De Havilland 4	190 & 250 H.P. Rolls-Royce.	An army type machine now being built for R. N. A. S. Large two-seater tractor, used for fighting and reconnaissance patrols. Of very good performance.
Farman F.40.	150 Renault.	A large two-seater "pusher." Supplied from France, and used in this country for gunnery, training, etc.
Graham White.	60 H.P. LeRhone & 80 H.P. Gnome.	An elementary school training machine (being replaced by Maurice Farmans).
Handley Page.	2-250 H.P. Rolls-Royce.	A very large three-seater bombing machine. Used for bombing raids.
Henri Farman.	135 H.P. Canton Unne.	A large "pusher" machine chiefly used in the Mediterranean for bombing and fighter patrols. Now becoming obsolete.
Maurice Farman.	75 & 80 H.P. Renault.	The standard machine used in the R. N. A. S. for elementary training.
Nieuport.	80 LeRhone, 110 & 130 Clerget.	Both single- and two-seater. The earlier types of 80 H.P. engines are now obsolescent. Used as a fast fighter and "chaiser."
Sopwith (a) "1½ Strutter."	110 & 130 Clerget.	Both single-seater and two-seater. Single-seater used as a bomber, the two-seater as a "fighter reconnaissance machine." One of the best machines in 1916. Now obsolescent.
(b) "Pup."	80 H.P. LeRhone.	Single-seater fighter. Very fast and with excellent climb. Used very considerably during 1916 in France, this machine is now outclassed by the latest Sopwith, Nieuport & Spad fighters, and is becoming obsolete. Will be used for higher training. Also for ship use, flying off the deck.
(c) "F1" or "Camel."	130 Clerget.	The latest Sopwith single-seater fighter Only just produced, and not yet available in quantities.
(d) Triplane.	130 Clerget.	A single-seater fighter of great speed and climbing powers. The last machine produced by Sopwith before the "Camel."
"Spad."	150 & 200 H.P. Hispano-Suiza.	A French machine. A single-seater fighter. Only lately produced and not yet available in quantities. 200 H.P. machine has a better performance in the way of speed and climb than any machine yet produced.
Short.	250 Rolls-Royce & 240 Sunbeam.	A large two-seater land bomber. Carries a great weight of bombs, but has poor speed and climb and is therefore vulnerable, and is becoming obsolete. A few still used in France.

and Seaplanes

Planes in Use in the Royal Naval in the Army

Seaplanes in Use in Royal Naval Air Service

(*NOT* INCLUDING EXPERIMENTAL MACHINES)

Machine	Engine	Duty
Large "America" Flying Boat.	2-250 H.P. Rolls-Royce or 2-320 H.P. Sunbeam.	A large three-seater boat for reconnaissance and patrol work from coast stations.
Small "America" Flying Boat.	2-125 H.P. Anzani.	A small edition of above. Now obsolescent, and only used for training.
A.D. Flying Boat.	200 H.P. Hispano-Suiza.	A medium flying boat designed in Air Department, hence the name. The first has only just been completed, and the machine will not be available in quantities for four months. For fleet reconnaissance work from seaplane carriers.
Blackburn Twin.	2-190 Rolls-Royce.	A large twin-engined 2-float seaplane. The first has just completed trials, and a further twenty ordered but will not be available for some months. For reconnaissance and coast patrol with bombs. Or would carry a torpedo.
"Baby" Seaplane.	110 & 130 H.P. Clerget.	A small single-seater seaplane for fighting and attack of Zepps. There are various types, all differing only in detail, e.g., Sopwith "Baby," Hamble "Baby," Blackburn "Baby."
Fairey "Campania."	250 H.P. Rolls-Royce.	A 2-float seaplane designed for use in seaplane carriers. Carries eight hours' fuel, and to be used for fleet reconnaissance. First machine just completed trials and will not be available in quantities for some months.
M. Farman.	150 H.P. Hispano-Suiza.	After standard Maurice Farman practice, but with floats. 50 on order, but none yet delivered. For training and for coast patrol, etc.
"Porte Boat."	3-250 H.P. Rolls-Royce.	The largest type flying boat. Designed by Wing Commander Porte. Has not proved so handy as the "Large America" type and no more are being ordered after the ten now on order are completed.
Short.	150 H.P. Sunbeam. 135 H.P. Canton Unne.	Two of the earlier pattern Short seaplanes. Now only used for training.
	225 H.P. & 240 H.P. Sunbeam.	The standard 2-float seaplane at present in use in R. N. A. S. Used for reconnaissance and submarine patrol from coast stations.
	240 H.P. Renault.	Also from seaplane carriers. Also for higher training.
	320 H.P. Sunbeam.	The latest short seaplane, designed as a torpedo carrier. Also used for patrol work. Only two or three machines delivered at present. Will not be available in quantities for some months.
"Wight" (J. S. White of Cowes).	250 H.P. Rolls-Royce.	Originally designed as a land-bombing machine. Sixteen out of the twenty are being converted into seaplanes. The first so converted has given a very good performance, and a further fifty will be ordered. Will not be available in quantities for some months. Used similarly to the 225 & 240 Short.
White & Thompson and "F. B. A." Boats.	100 H.P. Gnome and 120 H.P. Austro-Daimler.	A small flying boat, now only used for training purposes. The F. B. A. was originally a French machine, but is built in this country by the White & Thompson Co.

The above table gives a list of the seaplanes in use by the British Navy with their engines and a brief general description of each type. The table is arranged alphabetically according to the names of the planes. It will be seen that the horsepower of seaplanes so far built ranges from 110 to 750, but it is stated that the large 750 hp. Porte seaplane has been discarded, it having proved less manoeuverable than the 500 hp. American plane

British Army Airplane Engines With Their Respective Machines

Engine	Machine	Category	Remarks
	ROTARY		
80 Clerget	Avro	T	7-cylinder.
	Bristol Scout	F	
	Bristol Monoplane	..	9-cylinder.
	Nieuport 2-Seater	C.R.	
	Sopwith 1½ Strutter	F.R.	
110/130 Clerget	Sopwith Camel	F	
	Sopwith Triplane	F	
	Vickers Scout F.B. 19	F	
	Avro	T	7-cylinder.
	Bristol Scout	T	
80 Gnome	G.W. Biplane	T	
	H. Farman	T	
	Avro	T	9-cylinder.
	Bristol Scout	F	
80 Le Rhone	Sopwith Scout	F	
	Morane Parasol	C.R.	
	De Haviland 5	F	9-cylinder.
	Morane Parasol	C.R.	
	Nieuport Scout	F	
110 LeRhone	Vickers F.B. 12	F	
	Vickers F.B. 19	F	
	Nieuport 2-Seater	C.R.	
	Avro	T	9-cylinder.
	De Haviland 2	F	
100 Mono	F.E. 8	F	
	Vickers F.B. 9	T	
	RADIAL		
140 Salmson (C. Unne)	H. Farman (All Steel)	C.R.	10-cylinder Stationary W. C.
	STATIONARY WATER COOLED		
	A.W.Reconnaissance	C.R.	6-cylinder Vertical.
160 H.P. Beardmore	F.E. 2B	F.R.	
	Martinsyde	B	
120 H.P. Beardmore	F.E. 2B	T	6-cylinder Vertical
	Martinsyde	B	
200 B.H.P.	De Haviland 4	F.R.	6-cylinder Vertical.
	Curtiss J.N.3 & J.N.4	T	8-cylinder V Type.
90 Curtiss	De Haviland 6	T	
	Maurice Farman	T	
	F.E. 9	F.R.	8-cylinder V type: a modern type based on latest principles. 200 H.P. fitted with reduction gear to propeller.
150/200 Hispano Suiza	S.E. 5	F	
	S.P.A.D.	F	
190 Rolls Royce	Bristol Fighter	F.R.	12-cylinder V type: now being developed to give 260 H.P.
250/300 Rolls Royce	F.E. 2D	F.R.	12-cylinder V type: now being developed to give 360 H.P.
	De Haviland 4	F.R.	
200 R.A.F. 3a	De Haviland 4	B	12-cylinder V Type.
220/240 Renault	Not in use in army	..	12-cylinder V Type.
	STATIONARY AIR COOLED		
70/75 Renault	M. Farman	T	8-cylinder V Type.
	B.E. 2	T	8-cylinder V Type.
	Caudron	T	
	De Haviland 1	T	
80 Renault	M. Farman	T	
	De Haviland 6	T	
	A.W.B.E.	C.R.	8-cylinder V Type.
90 R.A.F. 1a	B.E. 2	C.R.	
	De Haviland 6	T	
	B.E. 12 & 12a	B	12-cylinder V Type.
140 R.A.F. 4a	R.E. 7	T	
	R.E. 8	C.R.	

C.R.—Corps Reconnaissance. F.R.—Fighter Reconnaissance. B.—Bomber. F—Fighter. T—Training.

French Experimental Engines

ORDERED IN QUANTITY

Make of Engine	Nominal H.P.	Type	No. of Cyls.	Bore, Mm.	Stroke, Mm.	Normal H.P.	Normal R.P.M.	Prop. R.P.M.	Compression Ratio	M.E.P. at Normal R.P.M.	Piston Speed at Normal R.P.M.	Weight, Dry	Max. B.H.P.	Max. R.P.M.
Clerget 9B	130	Rotary	9	120	160	130	1250	1250	....	83	1312	377	.....	.....
Hispano 38	180	W.C.90° Vee	8	120	130	208	1800	1800	5.3	127.9	1536	442	245	2170
Hispano 35 & 44	220	W.C.90° Vee	8	120	130	222	2000	1500	5.3	122.4	1706	495	235	2220
LeRhone	120	Rotary	9	112	170	133	1250	1250	....	91.6	1394	337	.....	.....
Lorraine	220	W.C. 90° V.	8	120	170	245	1500	1500	5.2	138.6	1672	533	270	1700
Lorraine	275	W.C. 90° V.	8	120	175	276	1650	1650	5.2	135.3	1897	545	300	1800
Mono	150	Rotary	9	115	170	165	1350	1350	5.45	103.7	1505	290	171	1450
Renault	190	W.C. 50° Vee	8	125	150	190	1550	1550	5	107.2	1519	486	196	1600
Renault	300	W.C. 50° Vee	12	125	150	300	1550	1550	5	113.6	1519	793	310	1600
Salmson 29	250	W.C. Radial	9	125	170	230	1500	1500	5.4	107.8	1672	473	280	1650

The above table of French experimental aircraft engines shows that the French are now going in quite strongly for the V type, though continuing their work on rotary and radial types

Exports of Airplanes and Parts for Seven Years

Parts

(Figures not given separately prior to 1913)

	1913	1914	1915	1916	1917	1918	Totals by Countries
Europe:							
Denmark	....	....	....	....	$29,236	....	$29,236
France	$3,910	$9,876	....	$18,421	132,432	$1,118,409	1,283,048
Germany	140	5,225	....	....	....	....	5,365
Greece	....	....	....	556	....	....	556
Italy	....	....	$42,640	33,538	15,792	86,748	178,718
Netherlands	....	....	89	....	3,071	....	3,160
Norway	....	....	12,215	5,500	20,912	....	38,627
Portugal	....	....	....	....	4	....	4
Russia in Europe	....	52	3,500	69,095	38,000	12,600	123,247
Spain	....	....	....	70,000	....	....	70,000
Sweden	....	....	....	2,300	13,870	....	16,170
United Kingdom:							
England	....	3,513	400,043	4,361,700	1,615,913	4,362,543	10,743,712
Scotland	....	....	....	750	47,418	....	48,168
Ireland	....	....	....	14,580	....	....	14,580
North America:							
Bermuda	....	....	....	....	66	....	66
British Honduras	....	....	....	....	....	8	8
Canada	348	390	9,273	227,053	902,628	3,231,252	4,370,944
Central American States:							
Costa Rica	108	....	....	....	....	....	108
Guatemala	....	600	1,516	130	....	....	2,246
Honduras	....	....	....	....	108	....	108
Nicaragua	....	....	53	....	....	13	66
Panama	....	1,001	....	3	76	7,986	9,066
Salvador	....	1,850	80	....	....	....	1,930
Mexico	3,710	1,662	6,545	6,986	242	580	19,725
West Indies:							
British	....	....	....	59	80	1,767	1,906
Cuba	2,312	167	63	1,892	384	6,515	11,333
Danish	99	....	190	....	....	310	599
Dominican Republic	....	422	37	....	36	272	767
French	14	....	....	....	44	200	258
South America:							
Argentina	....	....	....	64	....	25	89
Brazil	5,193	3,543	....	3,072	1,990	15,300	29,098
Chile	....	....	....	459	....	89	548
Colombia	....	....	....	....	126	....	126
Guiana—Dutch	....	50	....	....	....	....	50
Venezuela	....	....	230	983	125	594	1,932
Asia:							
China	....	....	....	....	13,141	....	13,141
East Indies:							
British India	....	....	....	....	40	1,333	1,373
Dutch	....	....	....	325	54,913	....	55,238
Hongkong	....	8,000	....	....	....	....	8,000
Japan	....	255	....	8,150	5,400	22,003	35,808
Russia in Asia	....	....	104,450	....	237,742	....	342,192
Siam	....	....	572	....	114	1,381	2,067
Oceania:							
Australia	....	....	....	150	....	....	150
New Zealand	....	....	....	17,844	....	3,049	20,893
Philippine Islands	9,968	514	1,931	....	....	....	12,413
Africa:							
British—South	....	5	....	....	....	....	5
Totals	$25,802	$37,225	$583,427	$4,843,610	$3,133,903	$8,877,977	$17,501,944

Airplanes

(Figures not given separately prior to 1912)

	1912	1913	1914	1915	1916	1917	1918	Totals by Countries
Europe:								
France	*3* $8,100	*5* $12,100	*2* $8,000	.....	.....	.....	.....	*10* $28,200
Germany	*1* $5,400	*2* $9,000	*4* $16,375	.....	.....	.....	.....	*7* $30,775
Italy	.....	.....	.....	*3* $17,000	.....	.....	.....	*3* $17,000
Netherlands	.....	.....	.....	.....	.....	.....	*6* $76,226	*6* $76,226
Russia in Europe	*2* $10,000	*3* $18,500	*6* $65,574	.....	.....	.....	.....	*11* $94,074
Spain	.....	.....	.....	.....	*4* $27,980	.....	.....	*4* $37,980
Sweden	.....	.....	.....	.....	.....	.....	*3* $44,239	*3* $44,239
United Kingdom:								
England	.....	*1* $3,000	*5* $26,575	*61* $324,512	*240* $1,964,094	*12* $170,954	*4* $27,775	*323* $2,516,912
North America:								
Canada	*12* $39,060	*11* $22,300	*6* $18,700	*60* $88,215	*16* $95,046	*102* $616,088	*2* $6,500	*169* $885,889
Central American States:								
Guatemala	.....	.....	*1* $2,900	.....	.....	.....	.....	*1* $2,900
Panama	*2* $7,500	*1* $3,000	.....	.....	.....	.....	.....	*3* $10,500
Mexico	.....	.....	*3* $26,000	*6* $42,500	.....	.....	.....	*9* $68,500
West Indies:								
Jamaica	*1* $2,500	.....	.....	.....	*1* $875	.....	.....	*2* $3,375
Cuba	*2* $7,000	.....	.....	*1* $5,000	.....	.....	.....	*3* $12,000
Dominican Republic	.....	.....	*1* $2,500	.....	.....	.....	.....	*1* $2,500
South America:								
Argentina	.....	.....	.....	.....	*1* $5,000	.....	.....	*1* $5,000
Brazil	*3* $7,500	*1* $5,500	.....	.....	*3* $20,000	.....	*2* $34,500	*9* $67,500
Colombia	.....	.....	.....	*1* $500	.....	.....	.....	*1* $500
Ecuador	.....	.....	*1* $800	.....	.....	.....	.....	*1* $800
Venezuela	.....	*2* $3,500	.....	.....	.....	.....	.....	*2* $3,500
Asia:								
China	.....	*1* $1,000	.....	.....	.....	.....	.....	*1* $1,000
East Indies, Dutch	.....	.....	.....	.....	*2* $27,000	*12* $145,000	.....	*14* $172,000
Hongkong	.....	.....	*1* $4,000	*2* $4,000	.....	.....	.....	*3* $8,000
Japan	*1* $6,500	*2* $3,850	*3* $10,500	*1* $3,000	*2* $8,400	*7* $52,520	*3* $16,880	*19* $101,650
Russia in Asia	.....	.....	.....	*57* $473,292	.....	.....	.....	*57* $473,292
Turkey in Asia	.....	.....	*1* $7,000	.....	.....	.....	.....	*1* $7,000
Oceania:								
Australia	*1* $5,054	.....	.....	.....	.....	*2* $17,000	.....	*3* $22,054
Philippine Islands	*1* $7,191	.....	.....	.....	.....	.....	.....	*1* $7,191
Totals	*29* $105,805	*29* $81,750	*34* $188,924	*152* $958,019	*269* $2,158,395	*135* $1,001,542	*20* $206,120	*668* $4,700,555

ALTHOUGH the airplane branch of the automotive industry is relatively in its infancy, our exports of parts and complete planes have already touched substantial figures, with the promise of further increases as the development of commercial airplane service proceeds. In the case of parts, our exports valued at $25,802 in 1913 have increased to a value of $8,877,977 in 1918. The widely extended field of our foreign sales both of airplanes and parts augurs well for the future, as it is evident that in the earlier years many planes and their parts were purchased for experimental purposes. In many of the countries, notably the Republics of Latin America, national movements are being made to develop postal and general commercial service. The figures in italics denote the number of airplanes shipped.

Future Production Plans Will Require Special Machinery

Tractor, Truck and Car Fields Soon to Be on Largest Production Scale

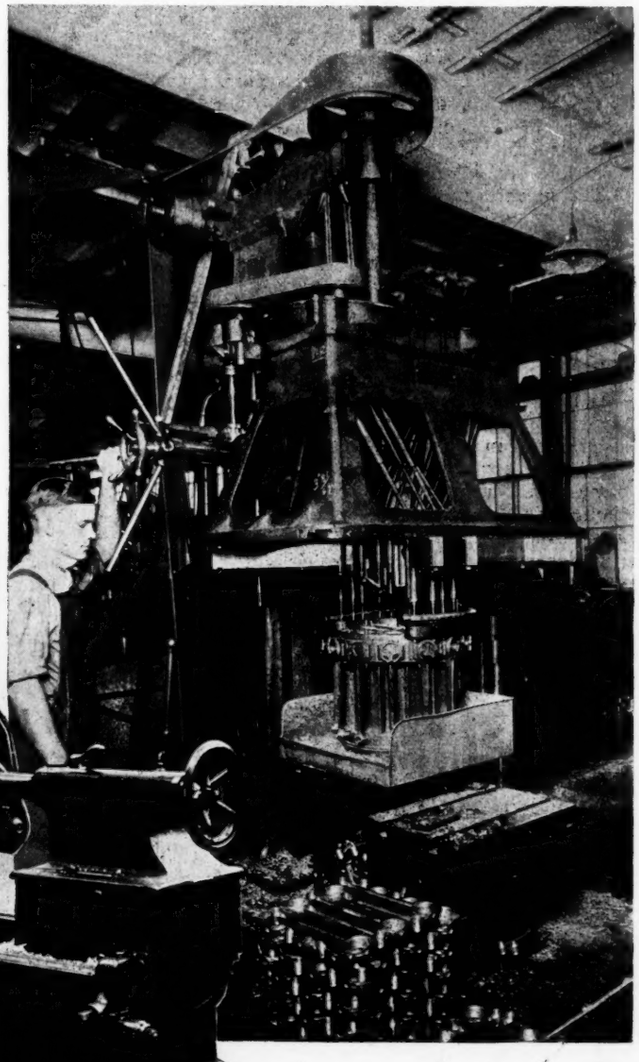
Special Jigs, Tools, Gauges Also Necessary to Fit Into Efficient Production Scheme

By J. Edward Schipper

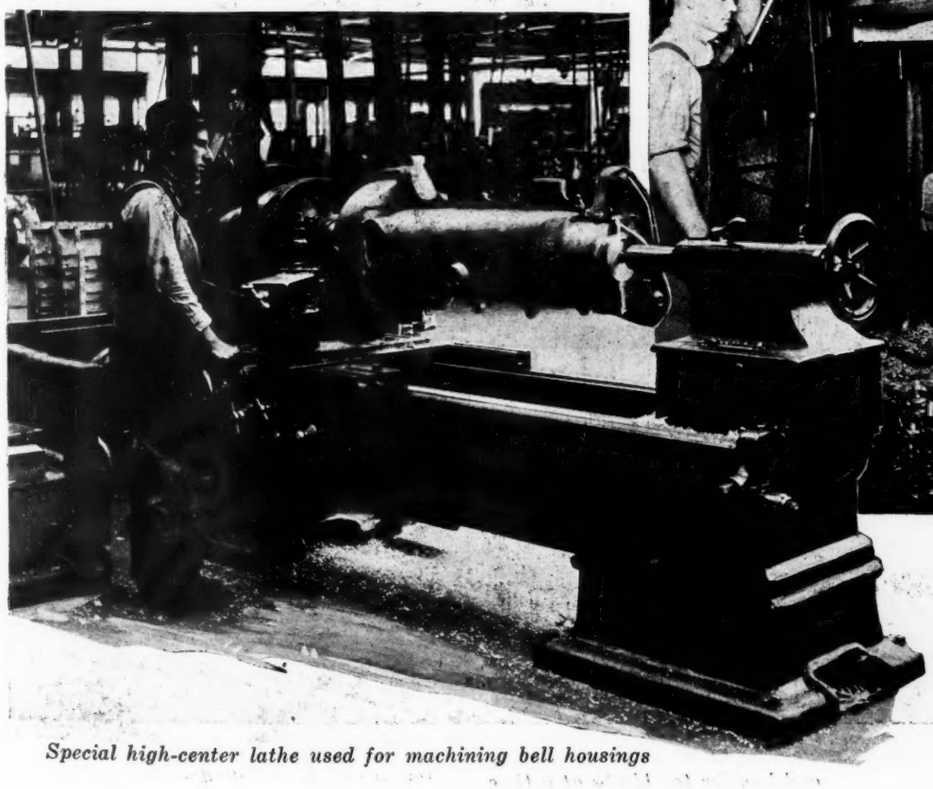
AUTOMOTIVE manufacture is still to enter its most active period. In the past all the big production companies have been in the automobile field. Ford, Overland, Buick, Dodge and other great concerns have carried the art of automobile manufacture to such efficiency that the overhead per car has been reduced to a degree where prices have dropped far below what would have appeared possible a decade ago.

With quantity production in the automobile field as a stepping stone, the era of great production and low prices is going to spread into the other branches of the automotive industry. It is certain that we are only on the eve of a great tractor move which will rival, if not surpass, the productive efforts of the automobile factories. A production of 300 farm tractors per day is now considered large. Yet this production will not begin to be a factor in some of the factories that are sure to spring up within the next 5 years.

Behind all this development in the manufacturing field there lies another development just as significant and without which the manufacturing development could not go on. This is the introduction of more special machinery particularly adapted to the wants of the automotive field. More and more the need for machinery built to fit a situation, or to form a link in the



Machining connecting-rods. On a machine of this kind several rods can be drilled at once by means of the rotating jig



Special high-center lathe used for machining bell housings

chain of manufacturing units designed for quantity production, has made itself felt.

Not so long ago we looked with unusual interest on a drill press or multiple-spindle drill which would drill thirty-two holes at a time, each one perfectly centered and in the same time formerly required to drill a single hole.

Not long after the development of the multiple-spindle drill, we became accustomed to the railway drill where a row of the multiple-spindle drilling machines built along a railway took care of all the milling and reaming and tapping on a piece of work which passed along below them on a track, carried by a swinging jig which brought the work into position and guided the tools.

With giant strides the machine-making industry, guided by the requirements and by the ingenuity of the production men, has overcome difficulties and progressed in quantity manufacture, until to-day we stand at a point where we can see that a concern which enters a field of competitive price must be well fortified by a highly efficient production scheme. This means special machinery, worked out to a degree even beyond what we have to-day in the great automobile factories.

It is necessary that the factory which goes into a low-priced field practically eliminate the work of the human hand and replace it by the work of human brains, and machinery. This does not mean a decrease in the necessity for labor, because it is a fact that those concerns which have gone furthest in the use of special production machinery and methods, have also gone furthest with the ideas of profit-sharing and welfare, and are, furthermore, the largest employers of labor.

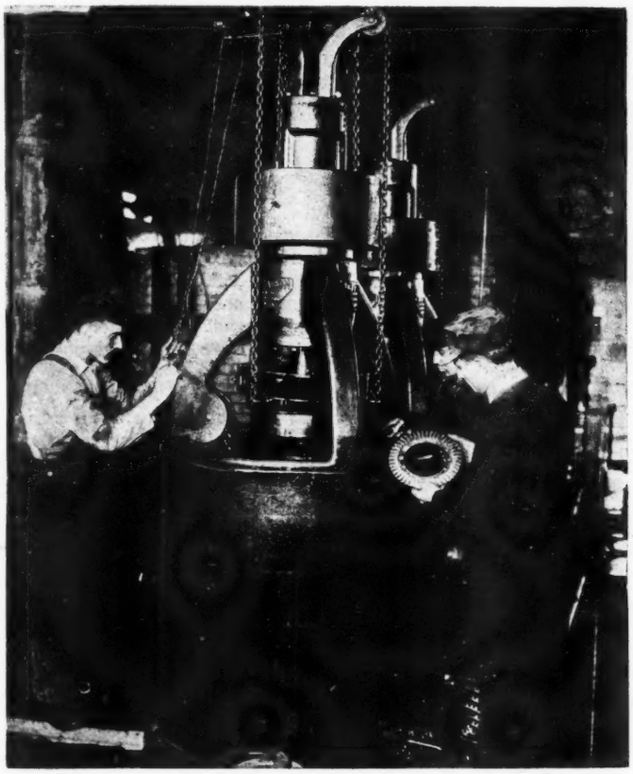
The supremacy of America in the manufacturing field depends on the efficiency of her manufacturing methods. America's labor is paid more than the labor of other countries, and the only way to offset this in the markets of the world is by such efficient production that the labor cost per unit and the overhead cost per unit are cut to a minimum. Machines that will do the same work or better work and will do it much more rapidly and accurately are going to be in demand in the automotive industry as never before.

It is beyond the powers of anyone to predict exactly what the tractor industry is going to be. Beyond the tractor industry, we can see on the horizon the airplane industry looming up in an embryonic stage but carrying behind it the thought that never has an improvement in transportation been discarded. Some day air transportation will come into its own.

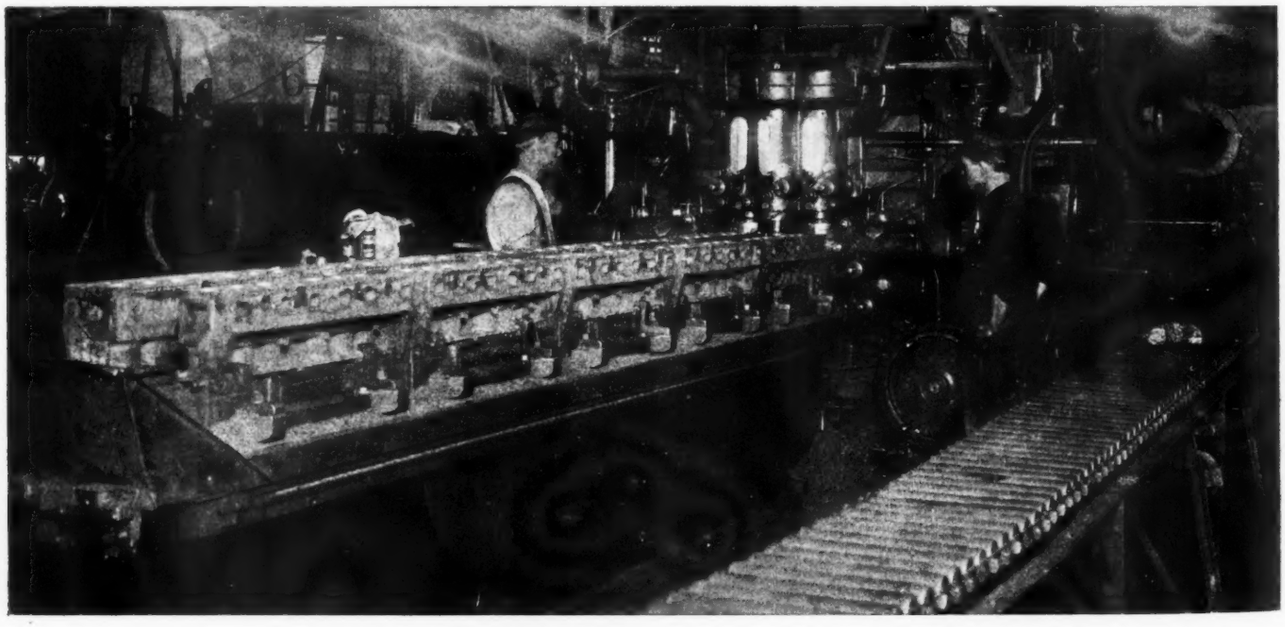
The internal combustion engine and the transmission parts with which it must be associated in the production of automobiles, trucks, tractors, airplanes, farm lighting equipment, and all the various other helps for humanity which have been rendered possible by the self-contained powerplant, lend themselves particularly well to the big production idea. In order to bring these essentials within the reach of every human being they must be low in price, and in order that they be low in price they must be produced in quantities.

Carrying this still further, production in quantity means that we must have special machines adapted for the particular work and fitting into the factory system as a part of its design.

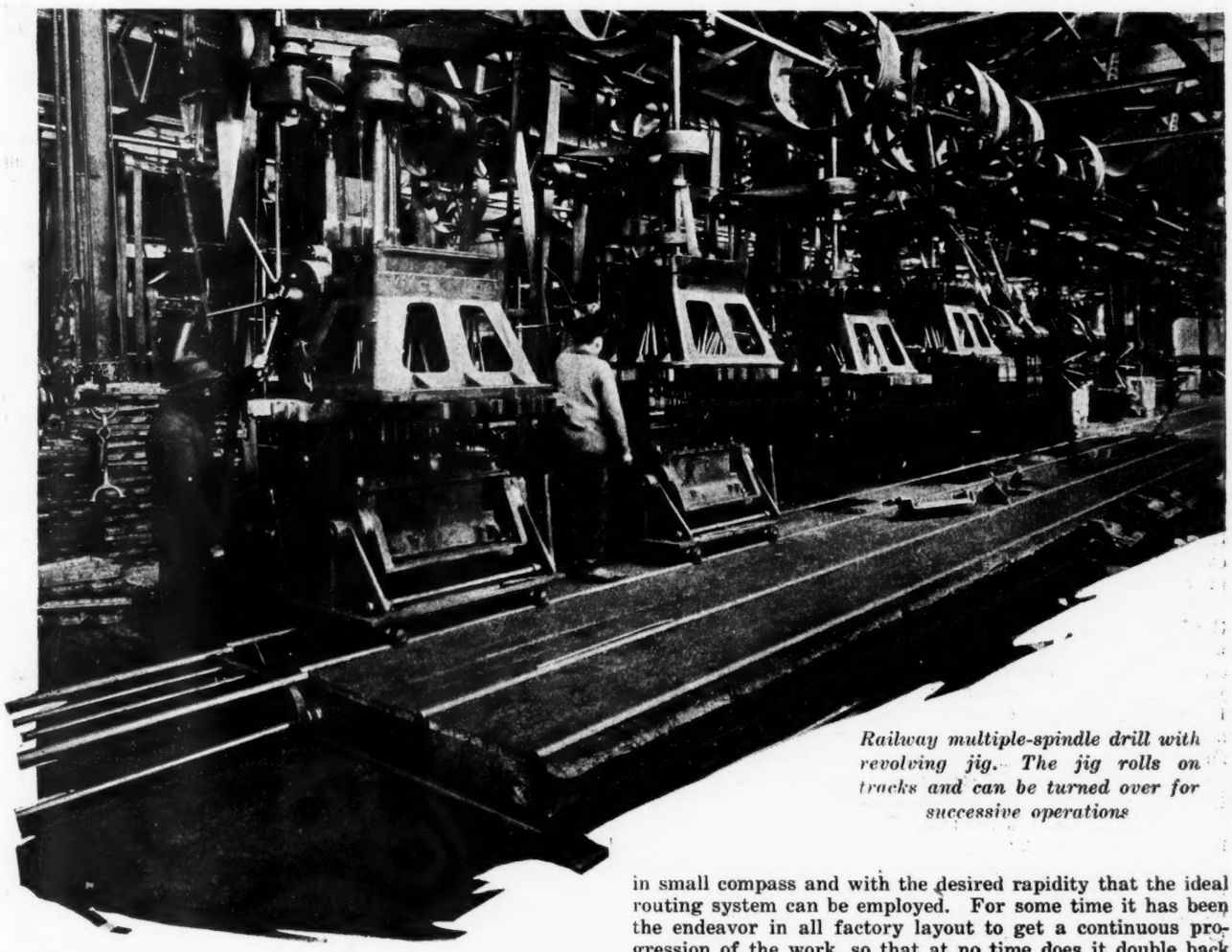
It is only by the use of machinery which handles its work



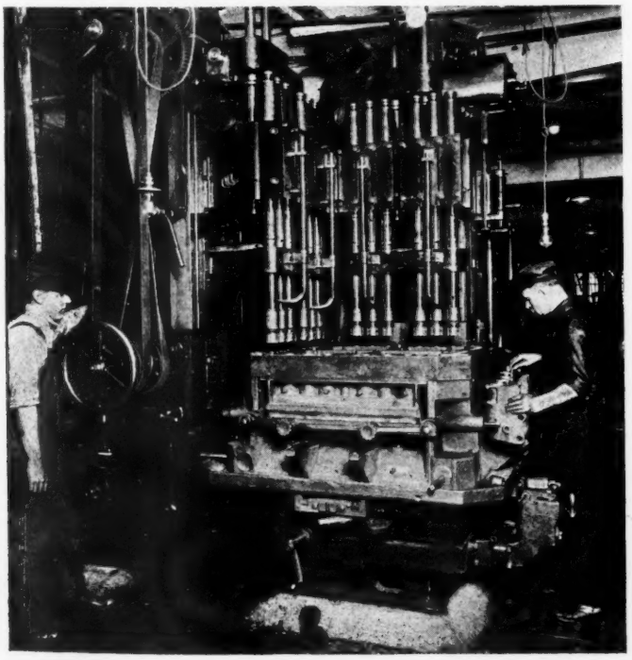
Gear hardening machine used by Dodge Brothers which automatically controls the oil treatment



An example of a machine with a long table. This faces the blocks for the Packard cylinders and handles ten blocks at a time



Railway multiple-spindle drill with revolving jig. The jig rolls on tracks and can be turned over for successive operations



A multiple boring machine in which the work proceeds continuously over to the rotating table. One block is set up while the operations are going on on the others

in small compass and with the desired rapidity that the ideal routing system can be employed. For some time it has been the endeavor in all factory layout to get a continuous progression of the work, so that at no time does it double back on itself or recross its path. Very often the limitations of machinery have compelled deviations from ideal routing, and one of the purposes of special machinery is to allow manufacture to conform to the ideal progression method.

It is of particular interest that the machinery for automotive apparatus must have the same fundamental characteristics. It makes little difference if the cylinders which must be bored are intended for automobiles, trucks, or tractors. The same fundamental cylinder boring tool is used for each. In the same way the connecting-rod end with its reaming and other manufacturing steps is handled identically regardless of whether these connecting-rods are used for farm lighting equipment or for mail trucks.

The methods of aligning the work and handling it in the most expeditious manner are the same. Crankcases produce about the same set of problems whether they are intended for one type of engine or another. They all have main bearings which must be aligned and camshaft bearings which must be treated in the same manner. And so it is throughout the entire engine parts field.

What must be done for a part of one type of engine must be done for a corresponding part of another type, so that the special machinery field in engine manufacture, although it must be to specialized design as far as installation dimensions are concerned, must also be of more or less standard nature, fundamentally.

It is not in manufacture alone that the special machine has come into its own. Testing machinery which carries the art of inspection down to its final limit is just as important. For instance, it is impossible to test a spring manually. A machine must be designed to do the work. Dodge Brothers have a machine that tests springs and does nothing else. For 24 hr. a day this machine rocks the car spring back and forth, hour after hour, day after day, constantly exerting on

it a pressure far greater than it would be subjected to under an automobile body.

The overload pressure is applied on this spring at the extreme rate of 155 vibrations per minute, until the spring has absorbed more shock than it would be called upon to survive in long years of actual service. With a conservative number of miles per year as a basis, it has been shown that some of the springs subjected to this test would last 60 years.

There are other machines of types which are quite different from those used for manufacturing or testing. For instance, there is a machine used by the Continental Motor Corp. which sand-blasts small parts. This is a table sand-blast in which connecting-rods, and all sorts of small engine parts can be piled and after a single revolution of the table they come out with a sand-blasted finish which would have taken an operator in a sand-blast cage hours of individual handling to have finished.

Still another field is that of gear hardening. In several automobile factories a hardening press is employed which is an excellent example of the adaptation of a special machine. This machine is in the form of a large tank in which a supply of oil is kept at a constant level and temperature. The rear axle driving gear goes into this tank, while held rigidly between two presses which act as an effective safe-guard against the natural tendency of the hot gear to warp when it comes in contact with the liquid. The oil solution of course brings the gear to the proper degree of hardness.

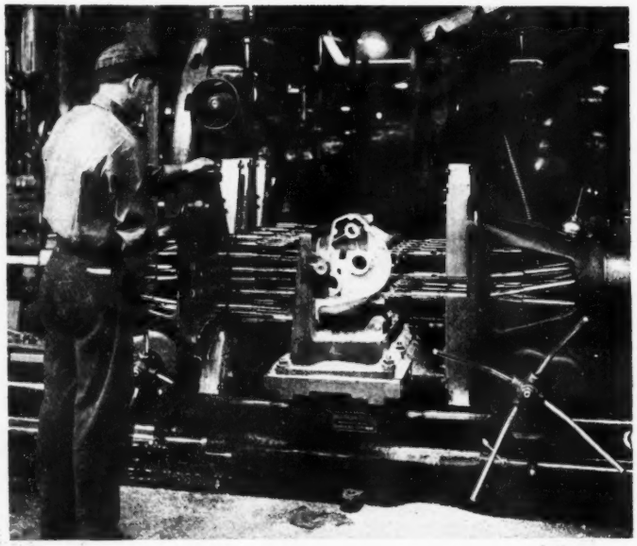
These are only a few specific examples of what is typical of the entire field. Even in the matter of jigs and fixtures, there is a tremendous industry that could exist on the needs of the automotive industry alone. In the larger establishments these jigs and fixtures are generally designed and worked out in the factory itself to fit the peculiar needs of the product and the scheme of manufacture. But they are in reality a part of the special machinery. By the use of the proper jig, the full benefit of the machine is reached, and the amount of manual work is cut to the limit.

Nowhere is the need for specially designed fixtures so well brought out as in testing or inspection apparatus. Fixed gages for the determination of accuracy can be made up to not only give a much closer check on the work, but also to make that checking much more rapid. This was exemplified to a marked degree in the manufacturing work of the Liberty engine. In no products except perhaps precision instruments have the limits been held so close and fixed in so many directions as they were in the Liberty engine. The use of a large number of especially designed gages was responsible in no small degree for the rapid manufacture of these engines in spite of the great accuracy required. Special machinery, special jigs and special fixtures, supplemented by the especially designed gages, leave no room for the human element which is the foe to interchangeability in manufactured products.

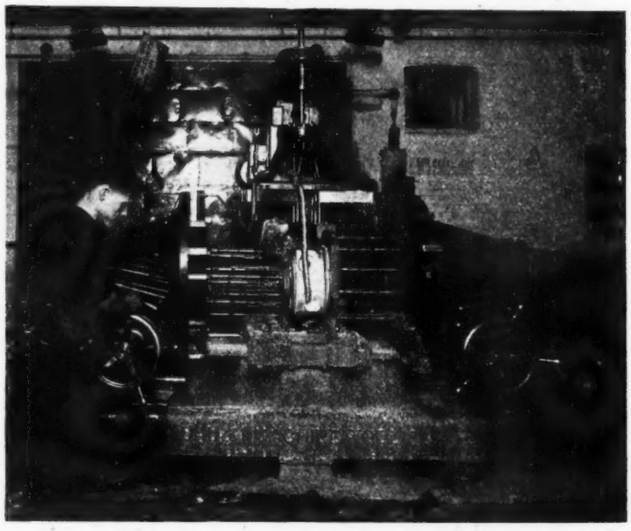
Industry is at the present time entering into a period of readjustment during which the problems of future manufacture are being closely studied. There are a number of concerns which are just about to enter quantity manufacture on products they have never touched before. This is due largely to experience gained in the war.

For example, take the Atwater-Kent company of Philadelphia. During the war the government asked this concern, owing to its experience in making small parts accurately, to enter the manufacture of prism binoculars for the army. This concern had never touched lens grinding, nor the manufacture of the small parts necessary for optical instruments, yet by the aid of new methods and modern machinery, it was soon turning out binoculars superior to those of German manufacture. Now that the war is over, this concern will not abandon the optical department, but will go ahead on a large commercial scale with this branch of manufacture.

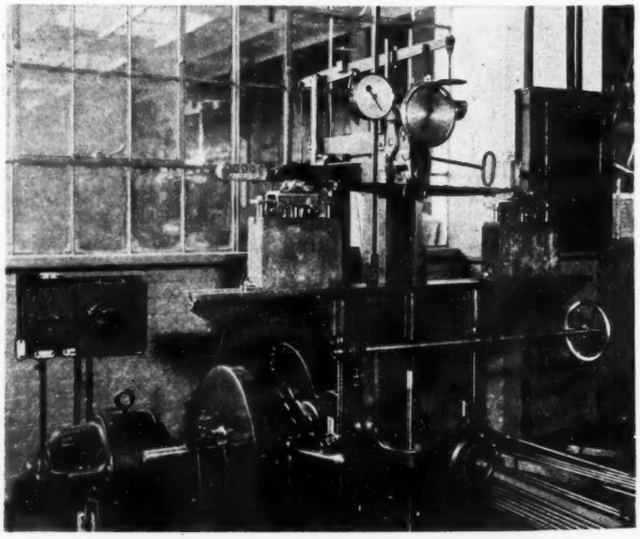
This is only one example picked from scores and illustrates how this new era upon which we are entering is going to make felt a demand for new equipment, new machinery, and new factory methods. Not in every case, however, are concerns going on with the work which was given them by the war department. They are going to swing back in most cases to their own line on an enlarged scale.



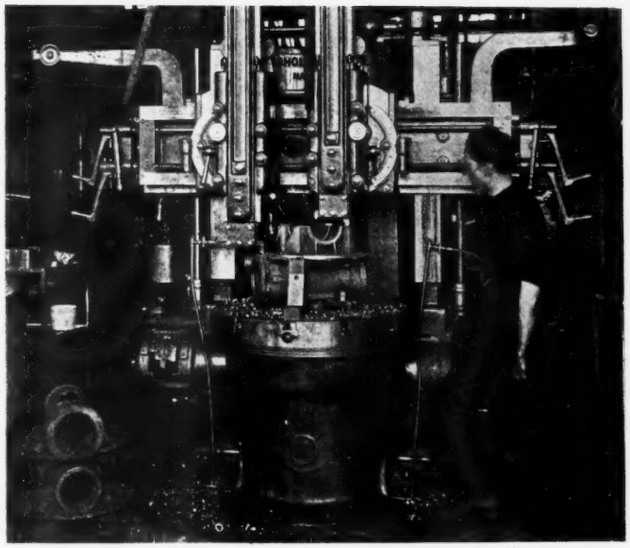
Drilling both sides of a Continental engine crankcase at the same time by means of a special drill and jig



An example of multiple-spindle drill which drills from three sides at the same time



Spring testing machine used by Dodge Brothers



The cutting operations can be handled rapidly on the largest of castings with this late type of machine

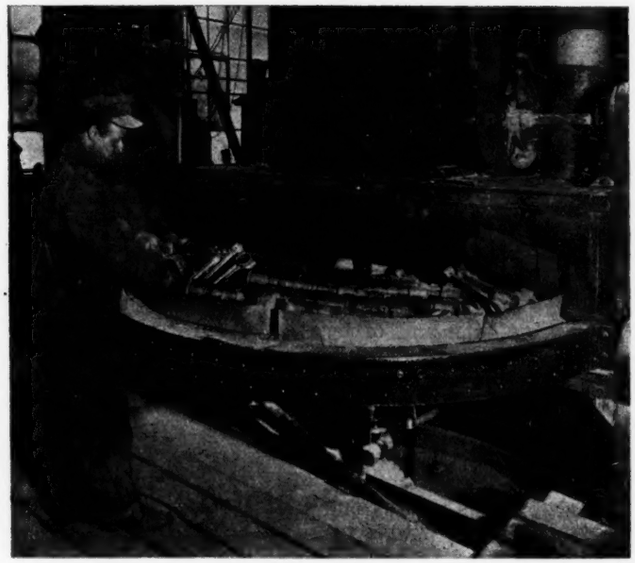
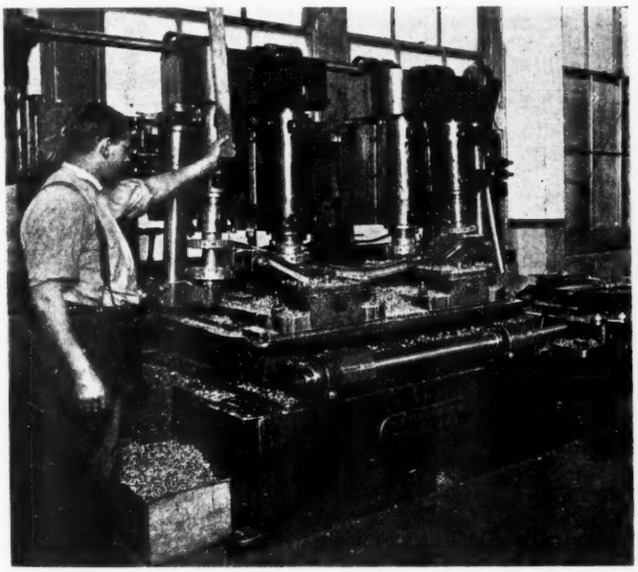
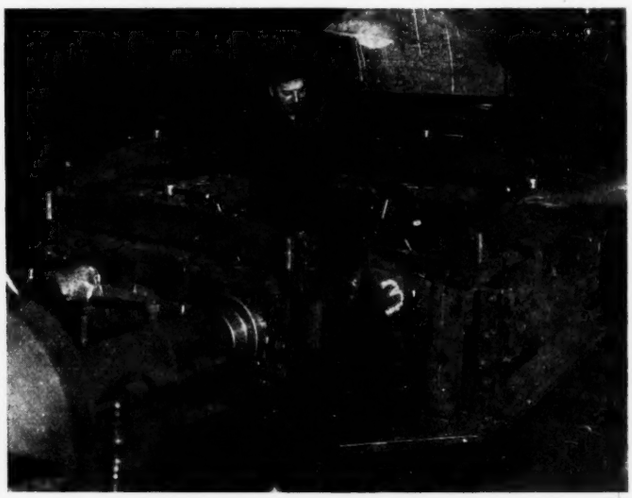


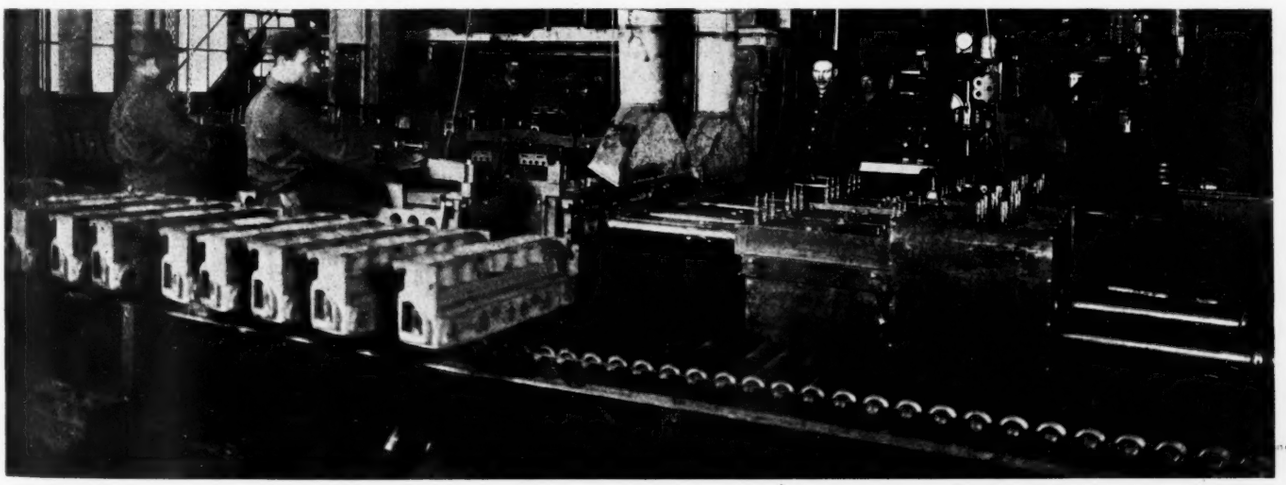
Table sand-blast machine which automatically puts sand-blast finish on a large number of small parts



This machine is facing off at one time all the necessary surfaces, six of them, on a Packard front axle



Cylinder block milling machine which handles four cylinder blocks on a single table



A good example of how special machinery fits into the progressive system. The gravity conveyor brings these cylinder blocks to the boring machine and they are then sent on their way for further operation

Metric Conversion Tables

A Series of Tables of Equivalents Arranged for Quick and Easy Reference

THE fundamental unit of the metric system is the METER—the unit of length. From this the units of capacity (LITER) and of weight (GRAM) were derived. All other units are the decimal subdivisions or multiples of these. These three units are simply related, *e. g.*, for all practical purposes one CUBIC DECIMETER equals one LITER and one LITER of water weighs one KILOGRAM. The metric tables are formed by combining the words "METER," "GRAM," and "LITER" with the six numerical prefixes, as in the tables herewith.

All lengths, areas, and cubic measures in the following tables are derived from the international meter, the legal equivalent being **1 meter = 39.37 inches** (law of July 28, 1866). In 1893 the United States Office of Standard Weights and Measures was authorized to derive the yard from the meter, using for the purpose the relation legalized in 1866, 1 yard equals $\frac{3600}{3937}$ meter. The customary weights are likewise referred to the kilogram (Executive order approved April 5, 1893). This action fixed the values, inasmuch as the reference standards are as perfect and unalterable as it is possible for human skill to make them.

All capacities are based on the practical equivalent 1 cubic decimeter equals 1 liter. The decimeter is equal to 3.937 inches in accordance with the legal equivalent of the meter given previously. The gallon referred to in the tables is the United States gallon of 231 cubic inches. The bushel is the United States bushel of 2,150.42 cubic inches. These units must not be confused with the British units of the same name, which differ from those used in the United States. The British gallon is approximately 20 per cent larger, and the British bushel 3 per cent larger, than the corresponding units used in this country.

The customary weights derived from the international kilogram are based on the value 1 avoirdupois pound = 453.5924277 grams. This value is carried out farther than that given in the law, but is in accord with the latter as far as it is there given. The value of the troy pound is based upon the relation just mentioned and also the equivalent $\frac{5760}{7000}$ avoirdupois pound equals 1 troy pound.

In view of the increasing use of metric measures and weights, and the extension of international standards, these tables will be useful for constant reference.

Fundamental Equivalents

PREFIXES		MEANING			UNITS
milli-	=	*one thousandth*	$\frac{1}{1000}$	.001	
centi-	=	*one hundredth*	$\frac{1}{100}$	.01	**"meter"** *for length.*
deci-	=	*one tenth*	$\frac{1}{10}$	.1	
Unit	=	*one*		1	**"gram"** *for weight or mass.*
deka-	=	*ten*	$\frac{10}{1}$	10	
hecto-	=	*one hundred*	$\frac{100}{1}$	100	**"liter"** *for capacity.*
kilo-	=	*one thousand*	$\frac{1000}{1}$	1000	

Fahrenheit-Centigrade Thermometer Scales Compared

F.	C.	F.	C.	F.	C.	F.	C.	F.	C.	F.	C.	F.	C.	F.	C.	F.	C.	F.	C.
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°
212	100	185	85.0	158	70.0	131	55.0	104	40.0	77	25.0	50	10.0	23	−5.0	−3	−19.4	−30	−64.4
211	99.4	184	84.4	157	69.4	130	54.4	103	39.4	76	24.4	49	9.4	22	−5.6	−4	−20.0	−31	−35.0
210	98.9	183	83.9	156	68.9	129	53.9	102	38.9	75	23.9	48	8.9	21	−6.1	−5	−20.6	−32	−35.6
209	98.3	182	83.3	155	68.3	128	53.3	101	38.3	74	23.3	47	8.3	20	−6.7	−6	−21.1	−33	−36.1
208	97.8	181	82.8	154	67.8	127	52.8	100	37.8	73	22.8	46	7.8	19	−7.2	−7	−21.7	−34	−36.7
207	97.2	180	82.2	153	67.2	126	52.2	99	37.2	72	22.2	45	7.2	18	−7.8	−8	−22.2	−35	−37.2
206	96.7	179	81.7	152	66.7	125	51.7	98	36.7	71	21.7	44	6.7	17	−8.3	−9	−22.8	−36	−37.8
205	96.1	178	81.1	151	66.1	124	51.1	97	36.1	70	21.1	43	6.1	16	−8.9	−10	−23.3	−37	−38.3
204	95.6	177	80.6	150	65.6	123	50.6	96	35.6	69	20.6	42	5.6	15	−9.4	−11	−23.9	−38	−38.9
203	95.0	176	80.0	149	65.0	122	50.0	95	35.0	68	20.0	41	5.0	14	−10.0	−12	−24.4	−39	−39.4
202	94.4	175	79.4	148	64.4	121	49.4	94	34.4	67	19.4	40	4.4	13	−10.6	−13	−25.0	−40	−40.0
201	93.9	174	78.9	147	63.9	120	48.9	93	33.9	66	18.9	39	3.9	12	−11.1	−14	−25.6	−41	−40.6
200	93.3	173	78.3	146	63.3	119	48.3	92	33.3	65	18.3	38	3.3	11	−11.7	−15	−26.1	−42	−41.1
199	92.8	172	77.8	145	62.8	118	47.8	91	32.8	64	17.8	37	2.8	10	−12.2	−16	−26.7	−43	−41.7
198	92.2	171	77.2	144	62.2	117	47.2	90	32.2	63	17.2	36	2.2	9	−12.8	−17	−27.2	−44	−42.2
197	91.7	170	76.7	143	61.7	116	46.7	89	31.7	62	16.7	35	1.7	8	−13.3	−18	−27.8	−45	−42.8
196	91.1	169	76.1	142	61.1	115	46.1	88	31.1	61	16.1	34	1.1	7	−13.9	−19	−28.3	−46	−43.3
195	90.6	168	75.6	141	60.6	114	45.6	87	30.6	60	15.6	33	0.6	6	−14.4	−20	−28.9	−47	−43.9
194	90.0	167	75.0	140	60.0	113	45.0	86	30.0	59	15.0	32	0.0	5	−15.0	−21	−29.4	−48	−44.4
193	89.4	166	74.4	139	59.4	112	44.4	85	29.4	58	14.4	31	−0.6	4	−15.6	−22	−30.0	−49	−45.0
192	88.9	165	73.9	138	58.9	111	43.9	84	28.9	57	13.9	30	−1.1	3	−16.1	−23	−30.6	−50	−45.6
191	88.3	164	73.3	137	58.3	110	43.3	83	28.3	56	13.3	29	−1.7	2	−16.7	−24	−31.1	−51	−46.1
190	87.8	163	72.8	136	57.8	109	42.8	82	27.8	55	12.8	28	−2.2	1	−17.2	−25	−31.7	−52	−46.7
189	87.2	162	72.2	135	57.2	108	42.2	81	27.2	54	12.2	27	−2.8	0	−17.8	−26	−32.2	−53	−47.2
188	86.7	161	71.7	134	56.7	107	41.7	80	26.7	53	11.7	26	−3.3	−1	−18.3	−27	−32.8	−54	−47.8
187	86.1	160	71.1	133	56.1	106	41.1	79	26.1	52	11.1	25	−3.9	−2	−18.9	−28	−33.3	−55	−48.3
186	85.6	159	70.6	132	55.6	105	40.6	78	25.6	51	10.6	24	−4.4	..	....	−29	−33.9	..	....

Comparison of Customary and Metric Units from 1 to 10

LENGTHS

Inches		Millimeters	Inches		Centimeters	Feet		Meters	U. S. Yards		Meters	U. S. Miles		Kilometers
0.03937	=	1	0.3937	=	1	1	=	0.304801	1	=	0.914402	0.62137	=	1
0.07874	=	2	0.7874	=	2	2	=	0.609601	1.093611	=	1	1	=	1.60935
0 11811	=	3	1	=	2.54001	3	=	0.914402	2	=	1.828804	1.24274	=	2
0.15748	=	4	1.1811	=	3	3.28083	=	1	2.187222	=	2	1.86411	=	3
0.19685	=	5	1.5748	=	4	4	=	1.219202	3	=	2.743205	2	=	3.21869
0.23622	=	6	1.96851	=	5	5	=	1.524003	3.280833	=	3	2.48548	=	4
0 27559	=	7	2	=	5.08001	6	=	1.828804	4	=	3.657607	3	=	4.82804
0.31496	=	8	2.3622	=	6	6.56167	=	2	4.374444	=	4	3.10685	=	5
0.35433	=	9	2.7559	=	7	7	=	2.133604	5	=	4.572009	3.72822	=	6
1	=	25.4001	3	=	7.62002	8	=	2.438405	5.468056	=	5	4	=	6.43739
2	=	50.8001	3.1496	=	8	9	=	2.743205	6	=	5.486411	4.34959	=	7
3	=	76.2002	3.5433	=	9	9.84250	=	3	6.561667	=	6	4.97096	=	8
4	=	101.6002	4	=	10.16002	13.12333	=	4	7	=	6.400813	5	=	8.04674
5	=	127.0003	5	=	12.70003	16.40417	=	5	7.655278	=	7	5.59233	=	9
6	=	152.4003	6	=	15.24003	19.68500	=	6	8	=	7.315215	6	=	9.65608
7	=	177.8004	7	=	17.78004	22.96583	=	7	8.748889	=	8	7	=	11.26543
8	=	203.2004	8	=	20.32004	26.24667	=	8	9	=	8.229616	8	=	12.87478
9	=	228.6005	9	=	22.86005	29.52750	=	9	9.842500	=	9	9	=	14.48412

AREAS

Square Inches		Square Millimeters	Square Inches		Square Centimeters	Square Feet		Square Meters	Square Yards		Square Meters	Square Miles		Square Kilometers	Acres		Hectars
0.00155	=	1	0.1550	=	1	1	=	0.09290	1	=	0.8361	0.3861	=	1	1	=	0.4047
0.00310	=	2	0.3100	=	2	2	=	0.18581	1.1960	=	1	0.7722	=	2	2	=	0.8094
0.00465	=	3	0.4650	=	3	3	=	0.27871	2	=	1.6723	1	=	2.5900	2.471	=	1
0.00620	=	4	0.6200	=	4	4	=	0.37161	2.3920	=	2	1.1583	=	3	3	=	1.2141
0.00775	=	5	0.7750	=	5	5	=	0.46452	3	=	2.5084	1.5444	=	4	4	=	1.6187
0.00930	=	6	0.9300	=	6	6	=	0.55742	3.5880	=	3	1.9305	=	5	4.942	=	2
0.01085	=	7	1	=	6.452	7	=	0.65032	4	=	3.3445	2	=	5.1800	5	=	2.0234
0.01240	=	8	1.0850	=	7	8	=	0.74323	4.7839	=	4	2.3166	=	6	6	=	2.4281
0.01395	=	9	1.2400	=	8	9	=	0.83613	5	=	4.1807	2.7027	=	7	7	=	2.8328
1	=	645.16	1.3950	=	9	10.764	=	1	5.9799	=	5	3	=	7.7700	7.413	=	3
2	=	1,290.33	2	=	12.903	21.528	=	2	6	=	5.0168	3.0888	=	8	8	=	3.2375
3	=	1,935.49	3	=	19.355	32.292	=	3	7	=	5.8529	3.4749	=	9	9	=	3.6422
4	=	2,580.65	4	=	25.807	43.055	=	4	7.1759	=	6	4	=	10.3600	9.884	=	4
5	=	3,225.81	5	=	32.258	53.819	=	5	8	=	6.6890	5	=	12.9500	12.355	=	5
6	=	3,870.98	6	=	38.710	64.583	=	6	8.3719	=	7	6	=	15.5400	14.826	=	6
7	=	4,516.14	7	=	45.161	75.347	=	7	9	=	7.5252	7	=	18.1300	17 297	=	7
8	=	5,161.30	8	=	51.613	86.111	=	8	9.5679	=	8	8	=	20.7200	19.768	=	8
9	=	5,806.46	9	=	58.065	96.875	=	9	10.7639	=	9	9	=	23.3100	22.239	=	9

VOLUMES

Cubic Inches		Cubic Millimeters	Cubic Inches		Cubic Centimeters	Cubic Feet		Cubic Meters	Cubic Yards		Cubic Meters
0.000061	=	1	0.0610	=	1	1	=	0.02832	1	=	0.7645
0.000122	=	2	0.1220	=	2	2	=	0.05663	1.3079	=	1
0.000183	=	3	0 1831	=	3	3	=	0.08495	2	=	1.5291
0.000244	=	4	0.2441	=	4	4	=	0.11327	2.6159	=	2
0.000305	=	5	0 3051	=	5	5	=	0.14159	3	=	2.2937
0.000366	=	6	0.3661	=	6	6	=	0 16990	3.9238	=	3
0.000427	=	7	0.4272	=	7	7	=	0.19822	4	=	3.0582
0.000488	=	8	0.4882	=	8	8	=	0.22654	5	=	3.8228
0.000549	=	9	0.5492	=	9	9	=	0.25485	5.2318	=	4
1	=	16,387.2	1	=	16.3872	35.314	=	1	6	=	4.5874
2	=	32,774.3	2	=	32 7743	70.629	=	2	6.5397	=	5
3	=	49,161.5	3	=	49.1615	105.943	=	3	7	=	5.3519
4	=	65,548.6	4	=	65.5486	141.258	=	4	7.8477	=	6
5	=	81,935.8	5	=	81.9358	176.572	=	5	8	=	6.1165
6	=	98,323.0	6	=	98.3230	211.887	=	6	9	=	6.8810
7	=	114,710.1	7	=	114.7101	247.201	=	7	9.1556	=	7
8	=	131,097.3	8	=	131 0973	282.516	=	8	10.4635	=	8
9	=	147,484.5	9	=	147.4845	317.830	=	9	11.7715	=	9

(Continued on following page)

CAPACITIES

U. S. Liquid Ounces		Milliliters (cc.)	U. S. Liquid Quarts		Liters	U. S. Liquid Gallons		Liters	U. S. Dry Quarts		Liters	U. S. Bushels		Hecto-liters
0.03381	=	1	1	=	0.94636	0.26417	=	1	0.9081	=	1	1	=	0.35239
0.06763	=	2	1.05668	=	1	0.52834	=	2	1	=	1.1012	2	=	0.70479
0.10144	=	3	2	=	1.89272	0.79251	=	3	1.8162	=	2	2.83774	=	1
0.13526	=	4	2.11336	=	2	1	=	3.78543	2	=	2.2025	3	=	1.05718
0.16907	=	5	3	=	2.83908	1.05668	=	4	2.7242	=	3	4	=	1.40957
0.20288	=	6	3.17005	=	3	1.32085	=	5	3	=	3.3037	5	=	1.76196
0.23670	=	7	4	=	3.78543	1.58502	=	6	3.6323	=	4	5.67548	=	2
0.27051	=	8	4.22673	=	4	1.84919	=	7	4	=	4.4049	6	=	2.11436
0.30432	=	9	5	=	4.73179	2	=	7.57087	4.5404	=	5	7	=	2.46675
1	=	29.574	5.28341	=	5	2.11336	=	8	5	=	5.5061	8	=	2.81914
2	=	59.147	6	=	5.67815	2.37753	=	9	5.4485	=	6	8.51323	=	3
3	=	88.721	6.34009	=	6	3	=	11.35630	6	=	6.6074	9	=	3.17154
4	=	118.295	7	=	6.62451	4	=	15.14174	6.3565	=	7	11.35097	=	4
5	=	147.869	7.39677	=	7	5	=	18.92717	7	=	7.7086	14.18871	=	5
6	=	177.442	8	=	7.57088	6	=	22.71261	7.2646	=	8	17.02645	=	6
7	=	207.016	8.45345	=	8	7	=	26.49804	8	=	8.8098	19.86420	=	7
8	=	236.590	9	=	8.51723	8	=	30.28348	8.1727	=	9	22.70194	=	8
9	=	266.163	9.51014	=	9	9	=	34.06891	9	=	9.9110	25.53968	=	9

MASSES

Avoir-dupois Ounces		Grams	Troy Ounces		Grams	Avoir-dupois Pounds		Kilo-grams
0.03527	=	1	0.03215	=	1	1	=	0.45359
0.07055	=	2	0.06430	=	2	2	=	0.90718
0.10582	=	3	0.09645	=	3	2.20462	=	1
0.14110	=	4	0.12860	=	4	3	=	1.36078
0.17637	=	5	0.16075	=	5	4	=	1.81437
0.21164	=	6	0.19290	=	6	4.40924	=	2
0.24692	=	7	0.22506	=	7	5	=	2.26796
0.28219	=	8	0.25721	=	8	6	=	2.72155
0.31747	=	9	0.28936	=	9	6.61387	=	3
1	=	28.3495	1	=	31.10348	7	=	3.17515
2	=	56 6991	2	=	62.20696	8	=	3.62874
3	=	85.0486	3	=	93.31044	8.81849	=	4
4	=	113.3981	4	=	124.41392	9	=	4.08233
5	=	141.7476	5	=	155.51740	11.02311	=	5
6	=	170.0972	6	=	186.62088	13.22773	=	6
7	=	198.4467	7	=	217.72437	15.43236	=	7
8	=	226.7962	8	=	248.82785	17.63698	=	8
9	=	255.1457	9	=	279.93133	19.84160	=	9

COMPARISON OF THE VARIOUS TONS AND POUNDS IN USE IN THE UNITED STATES

From 1 to 10 Units

Long Tons	Short Tons	Metric Tons	Kilo-grams	Avoirdu-pois Pounds	Troy Pounds
.89287	1	.90718	907.18	2,000.00	2,430.56
1	1.12000	1.01605	1,016.05	2,240.00	2,722.22
1.78571	2	1.81437	1,814.37	4,000.00	4,861.11
2	2.24000	2.03209	2,032.09	4,480.00	5,444.44
2.67857	3	2.72155	2,721.55	6,000.00	7,291.67
3	3.36000	3.04814	3,048.14	6,720.00	8,166.67
3.57143	4	3.62874	3,628.74	8,000.00	9,722.22
4	4.48000	4.06419	4,064.19	8,960.00	10,888.89
4.46429	5	4.53592	4,535.92	10,000.00	12,152.78
5	5.60000	5.08024	5,080.24	11,200.00	13,611.11
5.35714	6	5.44311	5,443.11	12,000.00	14,583.33
6	6.72000	6.09628	6,096.28	13,440.00	16,333.33
6.25000	7	6.35029	6,350.29	14,000.00	17,013.89
7	7.84000	7.11232	7,112.32	15,680.00	19,055.56
7.14286	8	7.25748	7,257.48	16,000.00	19,444.44
8	8.96000	8.12838	8,128.38	17,920.00	21,777.78
8.03571	9	8.16466	8,164.66	18,000.00	21,875.00
9	10.08000	9.14442	9,144.42	20,160.00	24,500.00

CUBIC INCH-CUBIC CENTIMETER CONVERSION TABLE

Cu. In.		Cu. Cm.	Cu. In.		Cu. Cm.	Cu. In.		Cu. Cm.	Cu. In.		Cu. Cm.	Cu. In.		Cu. Cm.
10	—	164	210	—	3441	410	—	6718	610	—	9995	810	—	13272
20	—	327	220	—	3605	420	—	6882	620	—	10159	820	—	13436
30	—	492	230	—	3769	430	—	7046	630	—	10323	830	—	13600
40	—	655	240	—	3933	440	—	7210	640	—	10487	840	—	13764
50	—	819	250	—	4097	450	—	7374	650	—	10651	850	—	13928
60	—	983	260	—	4260	460	—	7537	660	—	10815	860	—	14092
70	—	1147	270	—	4424	470	—	7701	670	—	10978	870	—	14256
80	—	1311	280	—	4588	480	—	7865	680	—	11142	880	—	14420
90	—	1475	290	—	4752	490	—	8029	690	—	11306	890	—	14583
100	—	16 8	300	—	4916	500	—	8193	700	—	11470	900	—	14747
110	—	1802	310	—	5079	510	—	8357	710	—	11634	910	—	14911
120	—	1966	320	—	5243	520	—	8521	720	—	11798	920	—	15075
130	—	2130	330	—	5407	530	—	8684	730	—	11962	930	—	15239
140	—	2294	340	—	5571	540	—	8848	740	—	12126	940	—	15403
150	—	2458	350	—	5735	550	—	9012	750	—	12289	950	—	15567
160	—	2622	360	—	5899	560	—	9176	760	—	12453	960	—	15730
170	—	2786	370	—	6063	570	—	9340	770	—	12617	970	—	15894
180	—	2950	380	—	6226	580	—	9504	780	—	12781	980	—	16058
190	—	3114	390	—	6390	590	—	9668	790	—	12945	990	—	16222
200	—	3277	400	—	6554	600	—	9831	800	—	13109	1000	—	16386

Lengths—Inches and Millimeters—Equivalents of Decimal and Common Fractions of an Inch in Millimeters

FROM $\frac{1}{64}$ TO 1 INCH

½'s	¼'s	8ths	16ths	32nds	64ths	Millimeters	Decimals of an Inch	Inch	½'s	¼'s	8ths	16ths	32nds	64ths	Millimeters	Decimals of an Inch
					1	= .397	.015625							33	=13.097	.515625
				1	2	= .794	.03125						17	34	=13.494	.53125
					3	= 1.191	.046875							35	=13.891	.546875
			1	2	4	= 1.588	.0625					9	18	36	=14.288	.5625
					5	= 1.984	.078125							37	=14.684	.578125
				3	6	= 2.381	.09375						19	38	=15.081	.59375
					7	= 2.778	.109375							39	=15.478	.609375
		1	2	4	8	= 3.175	.1250				5	10	20	40	=15.875	.625
					9	= 3.572	.140625							41	=16.272	.640625
				5	10	= 3.969	.15625						21	42	=16.669	.65625
					11	= 4.366	.171875							43	=17.066	.671875
			3	6	12	= 4.763	.1875					11	22	44	=17.463	.6875
					13	= 5.159	.203125							45	=17.859	.703125
				7	14	= 5.556	.21875						23	46	=18.256	.71875
					15	= 5.953	.234375							47	=18.653	.734375
	1	2	4	8	16	= 6.350	.2500			3	6	12	24	48	=19.050	.75
					17	= 6.747	.265625							49	=19.447	.765625
				9	18	= 7.144	.28125						25	50	=19.844	.78125
					19	= 7.541	.296875							51	=20.241	.796875
			5	10	20	= 7.938	.3125					13	26	52	=20.638	.8125
					21	= 8.334	.328125							53	=21.034	.828125
				11	22	= 8.731	.34375						27	54	=21.431	.84375
					23	= 9.128	.359375							55	=21.828	.859375
		3	6	12	24	= 9.525	.3750				7	14	28	56	=22.225	.875
					25	= 9.922	.390625							57	=22.622	.890625
				13	26	=10.319	.40625						29	58	=23.019	.90625
					27	=10.716	.421875							59	=23.416	.921875
			7	14	28	=11.113	.4375					15	30	60	=23.813	.9375
					29	=11.509	.453125							61	=24.209	.953125
				15	30	=11.906	.46875						31	62	=24.606	.96875
					31	=12.303	.484375							63	=25.003	.984375
1	2	4	8	16	32	=12.700	.5	1	2	4	8	16	32	64	=25.400	.1000

Lengths—Hundredths of an Inch to Millimeters

FROM 1 TO 100 HUNDREDTHS

Hundredths of an Inch	0	1	2	3	4	5	6	7	8	9
	0	.254	.508	.762	1.016	1.270	1.524	1.778	2.032	2.286
10	2.540	2.794	3.048	3.302	3.556	3.810	4.064	4.318	4.572	4.826
20	5.080	5.334	5.588	5.842	6.096	6.350	6.604	6.858	7.112	7.366
30	7.620	7.874	8.128	8.382	8.636	8.899	9.144	9.398	9.652	9.906
40	10.160	10.414	10.668	10.922	11.176	11.430	11.684	11.938	12.192	12.446
50	12.700	12.954	13.208	13.462	13.716	13.970	14.224	14.478	14.732	14.986
60	15.240	15.494	15.748	16.002	16.256	16.510	16.764	17.018	17.272	17.526
70	17.780	18.034	18.288	18.542	18.796	19.050	19.304	19.558	19.812	20.066
80	20.320	20.574	20.828	21.082	21.336	21.590	21.844	22.098	22.352	22.606
90	22.860	23.114	23.368	23.622	23.876	24.130	24.384	24.638	24.892	25.146

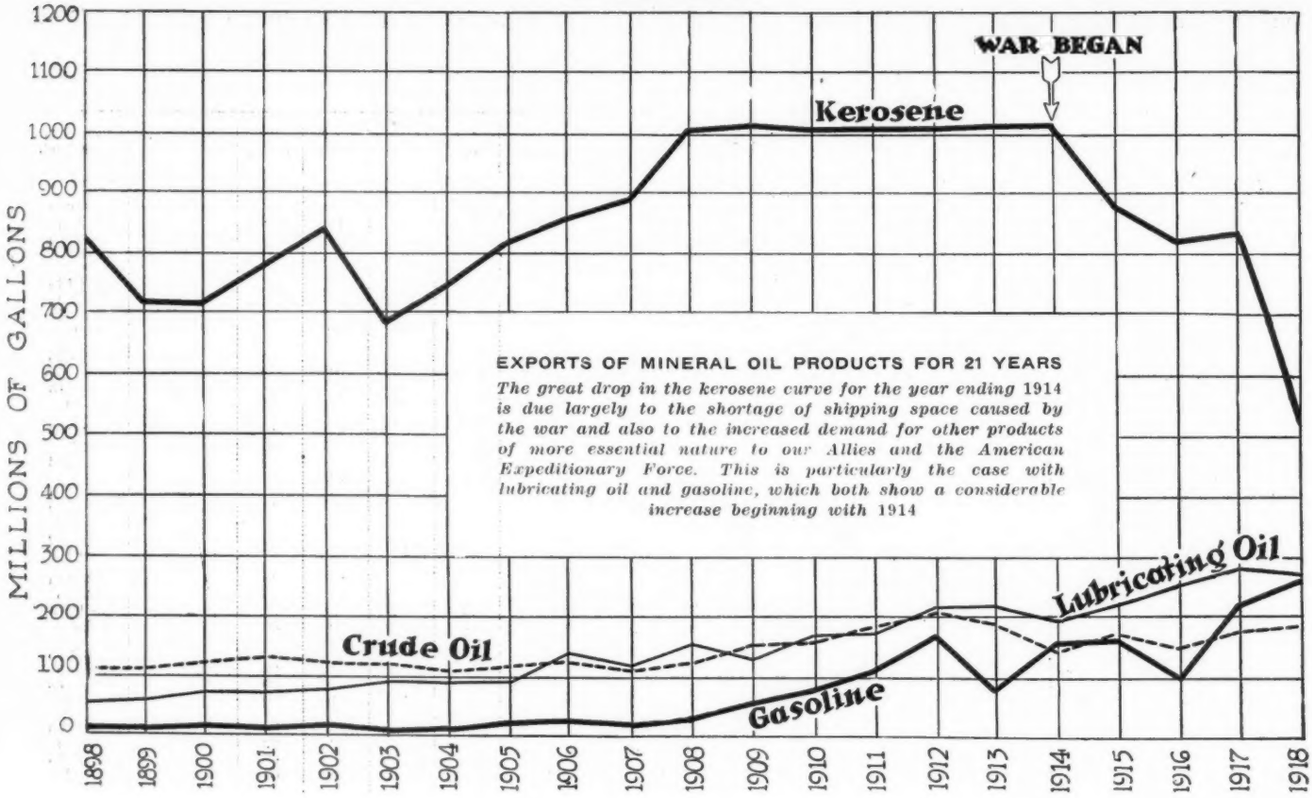
Lengths—Millimeters to Decimals of an Inch

FROM 1 TO 100 UNITS

Millimeters	0	1	2	3	4	5	6	7	8	9
	0	.03937	.07874	.11811	.15748	.19685	.23622	.27559	.31496	.35433
10	.39370	.43307	.47244	.51181	.55118	.59055	.62992	.66929	.70866	.74803
20	.78740	.82677	.86614	.90551	.94488	.98425	1.02362	1.06299	1.10236	1.14173
30	1.18110	1.22047	1.25984	1.29921	1.33858	1.37795	1.41732	1.45669	1.49606	1.53543
40	1.57480	1.61417	1.65354	1.69291	1.73228	1.77165	1.81102	1.85039	1.88976	1.92913
50	1.96850	2.00787	2.04724	2.08661	2.12598	2.16535	2.20472	2.24409	2.28346	2.32283
60	2.36220	2.40157	2.44094	2.48031	2.51968	2.55905	2.59842	2.63779	2.67716	2.71653
70	2.75590	2.79527	2.83464	2.87401	2.91338	2.95275	2.99212	3.03149	3.07086	3.11023
80	3.14960	3.18897	3.22834	3.26771	3.30708	3.34645	3.38582	3.42519	3.46456	3.50393
90	3.54330	3.58267	3.62204	3.66141	3.70078	3.74015	3.77952	3.81889	3.85826	3.89763

1 ft. lb. (work) = 0.1383 kg-m.
1 lb.-ft. (torque) = 0.1383 m-kg.
1 h.p. = 1.0138 chevaux vapeur (metric horsepower).
1 B.T.U. = 0.252 calories.
1 ft. p. s. = 0.30479 m.p.s.
1 ft. p.m. = 0.00508 m.p.s.
1 m.p.hr. = 1.609 km.p.h.
1 lb. p. sq. in. = 0.0703 kg. p. sq.cm.
1 lb. p. gal. = 0.1198 kg. p. liter.
1 B.T.U. p. lb. = 0.5556 cal. p. kg.

1 B.T.U. p. gal. = 0.06658 cal. p. liter.
1 lb. p. h.p.-hr. = 447.4 gr. p. cheval-heure.
1 gal. p. h.p.-hr. = 3.733 liters p. cheval-heure.
1 mile p. gal. = 0.425 km. p. liter.
Diametral pitch (gears) = 25.4 ÷ module.
Threads per inch (screws) = 25.4 ÷ metric pitch.
Fahrenheit deg. = (Centigrade deg. × 1.8) + 32.
1 mile per hour per second (acceleration) = 1.6 km. p. h. p. s.
1 ft. p. s. p. s. (acceleration) = 0.3048 m. p. s. p. s.



Production of Crude at New High Level

Exports of All Mineral Oil Products Except Kerosene Show Steady Increase for 21 Years

THE production of crude oil is always dependent upon the relation between the decline in the territory already yielding and the opening of new wells, new sands or new oil fields. Eastern oil properties have been declining for some years, while the demand has grown very rapidly in the same period. Other territories have been opened up in the Mid-Continent region—Louisiana and California principally—which have taken up the slack and added the necessary increase so that the production shows a steady and increasing rise as the demand came upon the industry. In the main, prospectors and producers have been able to keep up the discovery of new sands and fields at a sufficient pace to meet the demand of the automotive and other industries.

Twice of late years the production declined or remained stationary for almost a year; once, before the Mid-Continent field was more than experimental territory and after the drop in Texas and Indiana production had become severe (1907), and once again when the Cushing field in the Mid-Continent area declined in a few months from 300,000 bbl. daily to 100,000 bbl. daily (1912).

Prices are governed almost entirely by the relation of supply to market, and these times will find a corresponding

Mineral Oil Exports for 21 Years

Year	Crude Oil		Gasoline		Kerosene		Lubricating Oil	
	Quantity, Gals.	Value	Quantity, Gals.	Value	Quantity, Gals.	Value	Quantity, Gals.	Value
1898	113,297,397	$4,343,262	16,252,920	$1,080,797	824,426,581	$42,922,682	60,299,365	$7,239,454
1899	113,088,060	5,202,892	16,252,785	1,170,294	722,279,480	41,087,031	67,424,393	7,943,193
1900	133,023,656	7,364,162	21,985,093	2,016,802	721,025,237	55,978,937	74,583,969	9,744,367
1901	138,448,430	6,686,929	17,834,254	1,865,608	781,207,105	51,477,267	71,457,605	10,006,937
1902	133,536,800	6,084,818	23,498,479	1,677,738	842,829,070	53,390,345	76,035,611	10,274,743
1903	134,892,170	6,329,899	13,139,228	1,225,661	699,810,892	47,079,842	93,314,566	12,052,016
1904	114,576,920	6,572,923	16,910,121	1,802,207	741,567,086	57,902,503	88,810,130	12,048,842
1905	123,059,010	6,359,435	30,816,655	2,575,851	822,881,953	56,169,606	97,357,196	13,142,860
1906	139,688,615	7,016,131	32,756,694	2,613,677	864,361,210	54,181,617	146,110,702	17,974,721
1907	128,175,737	6,626,896	26,357,054	2,735,598	894,529,432	56,249,891	136,140,226	17,179,562
1908	135,223,575	6,465,114	36,242,370	4,003,827	1,041,725,901	70,809,415	159,763,900	20,370,613
1909	169,855,309	6,907,525	63,831,267	5,805,482	1,080,542,456	71,329,901	144,254,271	18,307,342
1910	168,903,985	5,277,181	77,650,923	6,302,418	1,005,027,536	62,477,527	170,430,277	20,891,473
1911	185,190,761	5,417,513	111,998,260	9,479,394	1,022,311,042	57,476,494	173,642,495	22,061,190
1912	208,110,365	6,831,367	171,040,150	15,437,736	1,044,049,848	59,845,823	202,125,197	25,970,271
1913	195,642,935	7,570,767	81,698,917	10,831,490	1,048,894,297	66,189,265	213,671,499	29,574,410
1914	146,477,342	6,812,672	151,611,537	21,699,475	1,157,283,310	74,500,162	196,884,696	27,852,959
1915	152,514,129	4,911,634	156,860,666	17,603,317	886,316,740	53,607,032	214,429,099	28,499,786
1916	163,732,589	5,754,084	100,148,554	16,297,561	823,143,138	52,283,057	250,395,439	37,452,084
1917	177,748,832	7,309,990	226,154,560	46,932,967	833,969,012	54,642,377	271,032,751	48,665,984
1918	183,672,778	9,107,519	260,300,337	61,447,382	528,805,501	47,488,425	269,667,145	66,146,827

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rise in prices followed by a considerable drop, due to the temporary effect upon the total production. There is no immediate probability of a large increase in production above demands in this country, as increase in prospecting will depend upon a decrease in the material and equipment necessary and the discovery of considerable areas of new sand or new fields of importance.

Mexico, which has the largest probable supply of oil under ground on proved territory, is not likely to attract the prospector or investor until conditions stabilize.

Lowering in prices is likely to come only from the reduced demands of European countries in peace requirements and the opening up of the European fields to full production, particularly the Russian. There is therefore no immediate prospect of such abundance of oil as would lead to any considerable price change in the immediate future.

The United States has produced 60 per cent of the total crude petroleum output from 1857 to 1917 and produced 67 per cent of the total output for the year of 1917. Russia was second in production, turning out 26 per cent during the years 1857-1917 and 13 per cent in the year 1917, showing a reduction in the 1917 production as compared with that production maintained previously—a decline probably due to the unsettled Russian conditions. Mexico, which is hailed as the bonanza of oil centers, stands third on the list, having produced only 3.18 per cent of all the crude petroleum from 1857 to 1917, although its production increased satisfactorily in 1917. This output was 11 per cent of the world output that year.

The total production of the world for 1857 to 1917 was 293,309,824,332 gal., or 6,983,457,246 bbl. of 42 gal. each. The production for 1917 was 21,027,345,612 gal., or 500,651,086 bbl. of 42 gal. each. During the 1857-1917 period the output of the United States was 178,611,048,126 gal. of crude petroleum, or 4,252,644,003 bbl. of 42 gal. each. Russia during the same period produced 75,968,486,714 gal., or 1,832,583,017 bbl. Rumania, which in 1857 was the only nation producing crude petroleum, shows a figure of 142,992,465 bbl. produced during the 1857-1917 period. But the Rumanian production to-day stands ninth in rank owing to the discoveries and developments of petroleum in the United States, Russia, Mexico, Dutch East Indies, India, Galicia, Japan and Formosa.

The production in 1917 in the United States totaled 14,093,255,242 gal., or 335,315,601 bbl., with the second highest production that of Russia, 2,898,000,000 gal., or 69,000,000 bbl., and Mexico third with 2,321,295,340 gal., or 55,292,770 bbl. A decline of Rumanian production in rank is shown by its 1917 production of 2,898,654 bbl. as compared with the output of the United States, Russia or Mexico. The Dutch East Indies and India both figure as important producers. The Dutch East Indies produced 12,928,955 bbl. and India 8500 bbl. in 1917.

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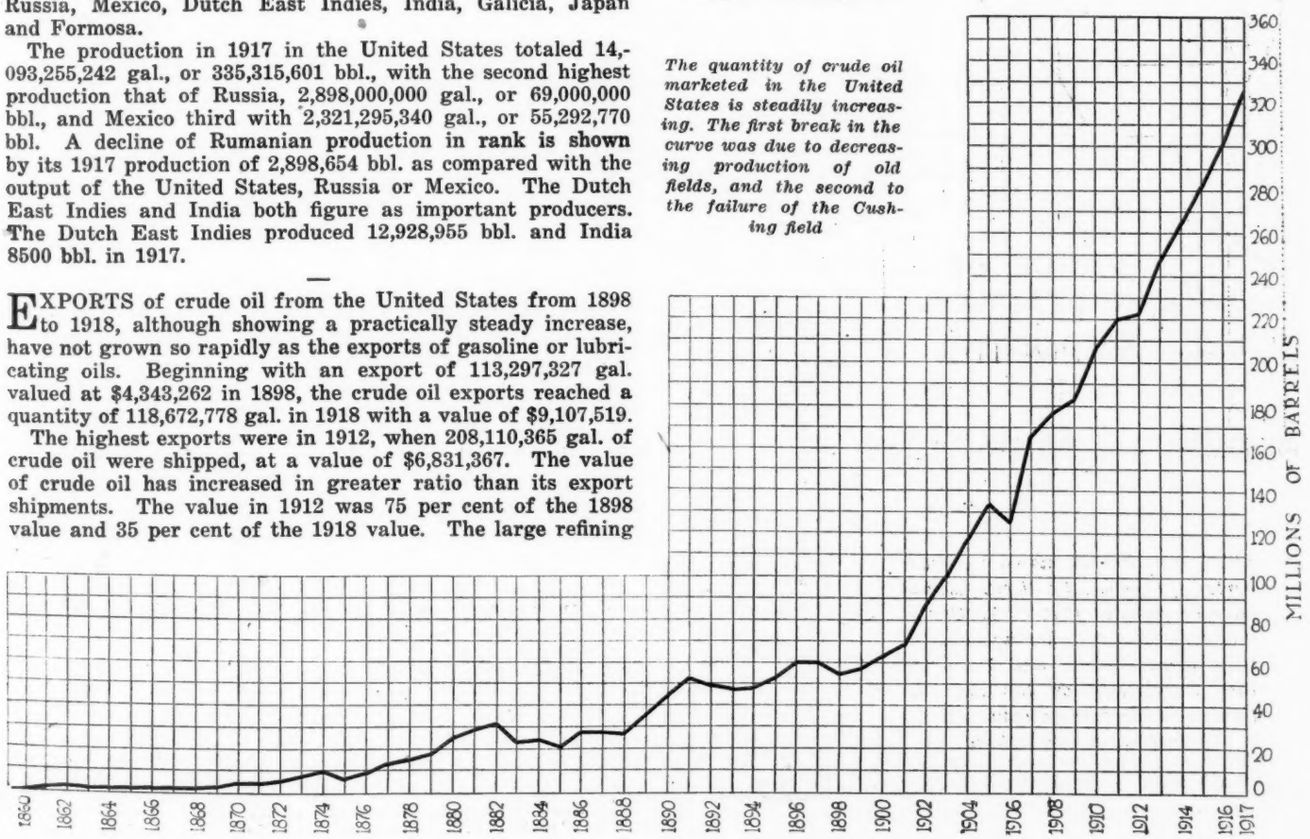
EXPORTS of crude oil from the United States from 1898 to 1918, although showing a practically steady increase, have not grown so rapidly as the exports of gasoline or lubricating oils. Beginning with an export of 113,297,327 gal. valued at $4,343,262 in 1898, the crude oil exports reached a quantity of 118,672,778 gal. in 1918 with a value of $9,107,519.

The highest exports were in 1912, when 208,110,365 gal. of crude oil were shipped, at a value of $6,831,367. The value of crude oil has increased in greater ratio than its export shipments. The value in 1912 was 75 per cent of the 1898 value and 35 per cent of the 1918 value. The large refining activities carried on in the United States and the desire for refined oil productions rather than for crude oil have hitherto been the chief reasons for the comparatively smaller exports of crude oil.

Gasoline exports in the last 20 years grew from 16,252,927 gal., valued at $1,080,797 to 260,300,337 gal. valued at $61,447,382. The growth of gasoline exports has been a steady one with few declines, those being comparatively small. The greatest decline was in 1916 as compared with 1915. The 1915 exports totaled 156,000,000 gal. as compared with 100,000,000 gal. in 1916. The reason for this was that in the first year of the war the Allies ordered from us more gasoline than they consumed and a stock of this was carried over into 1916. At the same time the submarine warfare showed its effects in 1916. Exports of 1917 and 1918, 226,000,000 and 260,000,000 gal. respectively, will undoubtedly drop to some extent within the next year, as these were almost entirely for war consumption. Prior to the war the exports for the entire world totaled 81,698,917 gal. with a value of $10,831,490. The effect of the automobile on gasoline consumption is readily apparent in the export figures, which jumped from 16,000,000 gal. in 1898 to 77,000,000 gal. in 1910. The value of gasoline for export was 15 cents per gal. in 1898 and 23 cents per gal. in 1918. The 1917 value of 25½ cents per gal. for export was undoubtedly the highest price paid in the history of gasoline, which has been as low for export as 6½ cents a gal.

Illuminating oil exports, which include kerosene, have seldom varied between the figures of 800,000,000 gal. and 1,000,000,000 gal. during the past 20 years, this being due to a declining use of oil for illuminating purposes in many of the districts. The exports in 1898 of 824,426,581 gal. are approximately equal to the exports of 1915-1916 or 1917 and far in excess of the exports of 1918, which reached 528,805,501 gal. Prior to the beginning of the European war the exports had reached a high figure of 1,157,283,310 gal., the largest quantity exported in any single year. The value of illuminating oil for export has increased from 5 cents per gal. in 1898, when it was more expensive than gasoline, to 9 cents per gal. in 1918, the highest price paid for illuminating oil for export.

The quantity of crude oil marketed in the United States is steadily increasing. The first break in the curve was due to decreasing production of old fields, and the second to the failure of the Cushing field



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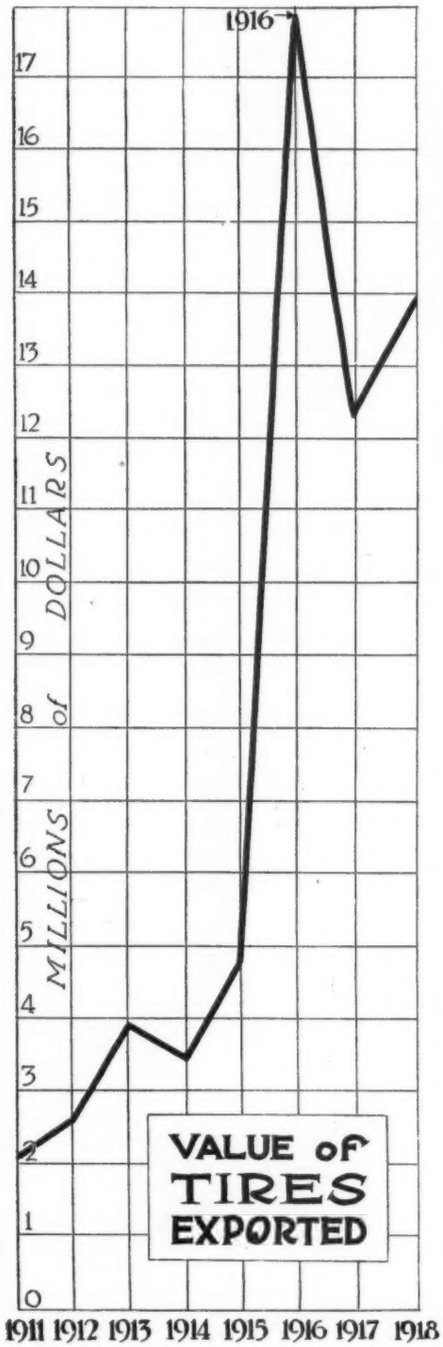
Exports of Pneumatic Tires for Eight Years

(Prior to 1911 Tires were included in "All other manufactures of rubber")



	1911	1912	1913	1914	1915	1916	1917	1918	Totals by Countries
Austria-Hungary	$329	$375	$299	$1,009	.....	.....	.....	.....	$2,012
Azores and Madeira Is.	.....	.....	.....	138	$178	$373	.....	$72	761
Belgium	821	51,620	401,900	15,730	.....	.....	.....	.....	470,071
Bulgaria	.....	.....	500	170	150	.....	.....	.....	820
Denmark	98	288	16,611	11,414	12,288	16,089	$6,917	.....	63,705
Finland	.....	.....	1,545	4,585	.....	.....	.....	.....	6,130
France	185,473	316,629	20,205	5,448	8,793	80,423	425,132	661,648	1,703,681
Germany	29,979	1,160	401,196	132,181	6,090	.....	.....	.....	5,703,606
Gibraltar	.....	.....	.....	.....	.....	.....	.....	129	129
Greece	.....	.....	.....	271	2,680	698	34,654	2,000	40,303
Iceland and Faroe Is.	.....	.....	.....	.....	.....	.....	61	.....	61
Italy	537	2,387	1,150	915	11,740	333,437	101,362	55,913	507,441
Malta, Gozo & Cyprus Is.	.....	.....	.....	.....	.....	.....	.....	.....	.....
Netherlands	.....	405	424	2,286	1,907	36,548	26,396	215	68,111
Norway	1,295	79	456	5,649	7,394	10,001	11,937	525	37,336
Portugal	693	271	282	157	1,434	25,990	9,055	15,488	53,370
Roumania	.....	174	146	211	.....	576	.....	.....	1,107
Russia in Europe	655	....	729	1,168	6,480	1,125,733	143,916	94,264	1,372,945
Serbia, Montenegro and Albania	.....	.....	.....	.....	.....	.....	.....	.....	.....
Spain	3,547	.....	567	1,595	2,408	32,984	77,753	12,233	131,087
Sweden	8,335	7,545	5,301	77,537	26,707	35,850	6,347	.....	167,622
Turkey in Europe	.....	.....	.....	.....	1,927	.....	.....	.....	1,927
England	1,104,416	1,177,579	1,125,718	1,503,440	2,655,000	9,175,248	2,569,901	618,071	19,629,472
Scotland	.....	.....	.....	336	245	116,858	66,753		184,192
Ireland	.....	167	.....	.....	.....	1,376	.....		1,543
North America:									
Bermuda	.....	.....	401	267	139	1,440	14	409	2,670
British Honduras	15	612	163	727	64	36	590	3,469	5,676
Canada	405,778	696,433	1,324,459	961,937	772,574	1,176,836	1,485,939	1,766,518	8,590,474
Central American States:									
Costa Rica	951	1,863	2,793	6,877	2,381	6,068	11,918	4,018	36,869
Guatemala	1,343	2,178	2,224	5,547	3,406	6,299	24,545	7,039	52,581
Honduras	.....	402	299	1,392	3,229	7,932	19,657	19,602	52,513
Nicaragua	.....	130	429	180	419	157	294	1,042	2,651
Panama	5,379	4,073	19,466	18,362	24,549	73,854	74,047	137,609	357,339
Salvador	525	346	1,705	2,084	2,617	11,673	22,530	22,319	63,799
Mexico	144,893	148,480	203,883	111,948	106,083	236,811	257,413	777,984	1,987,495
Newfoundland & Labrador	955	1,144	693	1,668	4,034	5,108	8,243	11,317	33,162
West Indies, British:									
Barbados	1,227	1,599	4,588	4,351	4,136	6,019	15,666	19,391	56,997
Jamaica	11,614	19,285	30,004	55,361	36,887	40,354	109,048	109,077	410,948
Trinidad & Tobago	639	4,316	16,364	17,023	22,672	30,510	45,654	107,353	242,601
Other British	477	510	1,869	2,472	3,327	8,337	21,525	25,991	64,509
Cuba	27,072	21,714	12,322	55,236	192,355	547,410	1,019,915	1,336,233	3,212,257
Danish (Virgin Is. of U. S.)	.....	190	540	1,739	577	1,099	2,753	6,939	13,837
Dominican Republic	321	2,934	2,306	2,902	3,092	18,223	37,441	61,631	128,873
Dutch	30	173	767	716	3,078	4,437	7,383	9,011	25,511
French	.....	134	115	1,045	1,527	1,293	19,333	35,474	59,077
Haiti	.....	.....	765	2,336	526	998	2,287	13,091	20,003
South America:									
Argentina	3,541	10,196	8,153	21,920	34,096	488,339	1,301,344	1,649,810	3,517,419
Bolivia	.....	.....	106	1,536	3,413	4,954	9,187	20,513	39,709
Brazil	10,112	24,952	47,537	11,839	77,425	295,479	698,876	455,102	1,619,322
Chile	262	354	2,844	10,636	21,351	58,807	261,603	725,876	1,081,737
Colombia	2,564	5,268	16,211	18,925	15,239	28,617	39,298	51,648	180,770
Ecuador	392	615	8,459	3,313	8,620	9,225	13,645	46,305	90,574
Falkland Is.	.....	.....	.....	.....	.....	.....	1,817	.....	1,817
Guiana, British	624	1,804	2,726	3,420	3,884	5,512	10,171	29,437	57,578
Dutch	.....	.....	63	544	308	1,339	2,588	1,918	6,760
French	.....	.....	.....	.....	.....	14	45	.....	59
Paraguay	.....	.....	.....	.....	16	.....	35	.....	51
Peru	557	745	1,273	4,838	5,253	9,663	27,934	107,236	157,499
Uruguay	586	849	1,990	17,987	11,826	76,508	100,427	221,634	434,937
Venezuela	130	1,835	10,703	20,439	32,635	71,849	128,966	116,612	383,169
Asia:									
Aden	.....	30	.....	55	264	1,585	440	2,536	4,910
China	590	850	622	28,326	18,971	41,298	36,952	53,039	180,648
China (leased territory), British	.....	.....	.....	.....	.....	.....	.....	.....	.....
French	.....	.....	.....	.....	.....	999	.....	.....	999
Japanese	.....	181	152	.....	.....	.....	.....	547	880
Chosen (Korea)	.....	.....	240	2,578	2,189	4,330	3,909	927	14,173
East Indies, British:									
British India	874	676	882	3,555	15,441	119,242	145,820	416,411	702,901
Straits Settlements	283	1,312	1,133	7,174	8,595	63,572	142,271	214,887	439,227
Other British	160	407	337	30	1,883	19,012	6,692	52,466	80,987
Dutch	916	6,170	860	2,677	7,688	201,287	415,742	347,912	983,252
Hongkong	997	4,568	677	1,057	879	4,189	3,252	6,412	22,031
Japan	15,319	13,531	29,975	18,629	12,741	20,045	34,243	83,235	227,718
Russia in Asia	.....	.....	.....	.....	.....	100	12,432	.....	12,532
Siam	207	.....	1,334	92	742	2,236	8,547	16,179	29,337
Turkey in Asia	.....	159	.....	.....	4,037	.....	.....	.....	4,196
Oceana, British:									
Australia	3,292	24,081	58,068	94,321	245,240	1,551,154	783,209	819,755	3,579,120
New Zealand	7,078	11,847	26,270	35,695	201,379	944,008	689,705	946,801	2,862,786
Other British	.....	300	37	432	164	574	5,008	16,124	22,639
French	36	665	956	7,278	5,262	8,990	8,102	10,801	42,090
German	.....	105	.....	396	.....	41	518	5,211	6,271
Philippine Is.	90,759	73,763	100,476	141,205	250,832	391,634	345,702	863,727	2,258,098
Africa:									
Belgian Kongo	.....	.....	.....	.....	.....	17	.....	.....	17
British Africa, West	.....	48	89	.....	1,149	27,301	10,967	33,470	73,024
South	8,310	7,049	17,057	27,090	32,833	291,318	391,211	693,035	1,467,922
East	.....	55	536	642	4,833	9,732	20,162	21,846	57,806
Canary Is.	.....	91	270	.....	.....	1,777	.....	.....	2,138
Egypt	.....	.....	.....	208	63	532	1,316	.....	2,119
French Africa	.....	.....	.....	.....	.....	.....	420	2,399	2,819
Italian Africa	.....	.....	.....	.....	.....	.....	174	.....	.....
Liberia	.....	.....	.....	.....	.....	.....	92	.....	266
Madagascar	.....	.....	.....	.....	.....	197	.....	.....	197
Portuguese Africa	71	108	.....	.....	946	3,601	.....	.....	4,726
Totals	$2,085,107	$2,657,809	$3,943,220	$3,505,267	$4,963,270	$17,936,227	$12,330,201	$13,977,671	$61,398,772

There are two reasons why our exports of pneumatic tires should have dropped in 1917-1918. One is that the gasoline shortage abroad became more acute and the other that restrictions on the importation of crude rubber caused a reduction in production

1919 Engineering Trends

(*Continued from page* 97)

will be such. Development of the aluminum cylinder engine was unquestionably halted by the rise in price and scarcity of that metal, but during the war facilities for aluminum production have increased greatly, so there is every reason to expect a large drop in price.

Also the alloy steel situation is due to improve rapidly, and those factories which have been doing aviation engine work are now accustomed to handling delicate steels, so they will not be so afraid of employing them. There is a very substantial difference in the weights of a frame made of carbon steel and one of nickel chrome, for example; and axles can be lightened considerably by using high-grade materials.

Weight is likely to receive consideration because it is a factor of importance in the performing ability of a car. There is quite an effect on the accelerative ability if a few hundred pounds is cut away. Of course, the user gains most from light weight in the saving of tires and fuel, but the average buyer is more likely to be influenced by a good demonstration than by any forecast of running cost which the dealer may make.

Better Material and Workmanship Forecast

Another experience of the past four years is likely to encourage the use of good materials and a rather higher grade of workmanship, and this is a growing realization of the fact that a few dollars added to manufacturing cost may easily save several times that sum on the service department account. Some of the manufacturers of low and medium-priced cars who cut prices heavily in 1915, and trimmed the factory cost to match, have discovered that their economies were more apparent than real.

Every one knows that it is cheaper to make a good job in the first instance than to do a poor one and have to patch it up at a later date; but the point it is desired to make is that many manufacturers now know how far it is safe to cut manufacturing cost, because they have already gone the limit, and even a bit beyond it.

Conditions in 1917, under the shadow of war, with material and labor both scarce and dear, and with every prospect of further rises, made it very difficult for any manufacturer of any article not a prime war necessity to branch out in any direction.

To-day the conditions are reversed. There is a huge and hungry market, materials are falling fast, and will fall still faster, while labor cannot at least go any higher. This means that an engineer will not be afraid in specifying an alloy steel or aluminum part that the material may become too expensive or too scarce. He knows that if he can afford to use it now he will still better be able to do so in six months' time. Nothing is pleasanter than to plan a chassis and estimate its cost on a basis of prices which must *fall*. The automobile engineer has not been able to do this for so long that he has forgotten the feeling. Fall in material prices is not a thing to gamble on, however. It would be unwise to take a chance of a fall of any definite amount, but it is infinitely helpful to be protected against a rise.

One metal it is sincerely to be hoped will come into use once more, and that is copper and its alloys. On the moderate-priced car of the day there are many parts of steel which should not be made of that material. Brass or aluminum should be used always for all small fittings, for switch covers, for door handles, and for all the parts which receive constantly the friction of handling.

Iron and steel cannot be plated so that they will not rust, except at a high cost, and even then there is a limit to the durability of the plate. Brass or aluminum lasts forever, keeps its appearance and its efficiency; for the rusting of a switch cover, for example, not only mars the look of the whole car but eventually interferes with the working of the switch. Brass fittings were forced off the medium-priced car in 1915, and let it not be forgotten how infinitely better for their purpose they were than the gimcrack affairs too often employed to-day.

Among the large engineering problems to be faced, by far the most important remains the fuel question. It has been with us for 5 years, and it becomes worse rather than better. This, too, is a thing in which aviation engine work has been entirely unhelpful, because aviation engines have had good low-gravity gasoline provided for them; they could not have shown anything like the same results with the commercial fuel.

It is an easily demonstrable fact that a car which performs well on ordinary gasoline will outdo itself easily if filled up with the best aviation gas. Now, just as the crux of kerosene vaporizer design is that the most heat is required when there is least exhaust heat available, and vice versa, so does this hold true for gasoline carburation.

The hot-spot manifold, if it will operate successfully at low speeds and low throttle positions, cannot fail to give too much heat at full speed and full throttle. The wide-open position is so seldom used by the average driver that this does not matter much up to a point, but if fuel gets poorer it will begin to cause trouble.

It may be recalled that in the Nash car, introduced in the fall of 1917, an attempt was made partially to counteract the natural perversity of the case by using as part of the fuel heating system an exhaust jacket which was shut off as the throttle opened. This seems to be a step in the right direction.

There was a patent granted to R. W. A. Brewer some time ago covering the idea of heating a portion of the intake by bringing the exhaust manifold against it, but with the interposition of a block of copper or other good conductor between the two. Then by making the copper adjustable the area of contact could be varied. This is another way of approaching the same end, and no doubt there are still others.

Control of Cooling System

Closely interconnected is the control of cooling systems. The thermostat control of water circulation and the air shutter over the radiator appeared just about the time when it was very difficult to introduce anything new. One or the other of these systems, or some combination giving the same effect, is destined to become as universal as electric starting, for it is just as necessary, and 1919 will surely see the development take place.

It is distinctly interesting to observe that in the few foreign "after war" models which have been described in the British automobile journals no special precautions seem to have been taken to care for heavy fuel. The European engineer seems fondly to expect gasoline of a pre-war grade. That he will get it is exceedingly unlikely, so here is another feature in which American engineering is going to show the way.

Mentioning European automobiles in this connection leads to another fact which is not without interest to the American engineer, and this is that a big proportion of new European cars are sixes. While the high grade four seems likely to remain the pre-eminent type abroad for a while, there are so many sixes that no doubt can exist but that European engineers are going to try out the small six on their public, and there is little question that this is due to the success in Europe of the medium-priced American sixes imported in 1916 and 1915.

S. A. E. Standardization Work in 1918

Numerous New Standards Put on Record, Mainly Relating to Aeronautical, Motorcycle and Marine Work—Activities to Be Pushed the Coming Year

DURING the year 1918 more new standards were added to the S. A. E. lists than in any previous year. The majority of these were aircraft standards, but marine, motorcycle and tractor standards were also included in considerable number. Much of the work that led to the adoption of these standards was done during 1917, but action on it by the Standards Committee was taken only at the winter meeting of 1918. Most of the activities of the Standards Committee and its numerous divisions during the past year and a half have been influenced by war conditions. For instance, all of the work carried on in connection with aircraft and motorcycle engineering was done in response to a direct request from a Government department. In addition to the regular standards the Standards Committee also has worked out various recommended practices, especially in connection with aircraft work.

The ball bearing standards, although in force now for quite a number of years, were revised during 1918. A practically complete series of thrust bearing standards also has been on the Data Sheets of the Society for some time, but in 1918 standard tolerances for such bearings were adopted.

The Engine Division drew up a design for hand starting cranks which was accepted by the Society in the course of the year and is now a recognized standard.

Magneto dimensions had been standardized previously for 4 and 6-cylinder engines, but certain dimensions applying only to 8 and 12-cylinder engines were added in 1918, as were complete dimensions for motorcycle magnetos. There are now three sets of standard magneto dimensions, viz., for 4 and 6-cylinder magnetos, 8 and 12-cylinder magnetos and motorcycle magnetos.

Standard Bracket Mounting for Generators

A standard bracket mounting for electric generators was adopted in August, 1918, and supplements the previously standardized flange mounting. The ignition distributer mounting adopted in 1917 was revised and extended in 1918. The same applies to the standard flange mounting for starting motors. Several detail standards have also been evolved by the Electrical Equipment Division and incorporated among the regular standards of the Society during the year. These include cables and cable terminals for starting motors, starting motor pinion details and starting switch location.

Clamps and fittings for rubber hose as used in aeronautic work were adopted. The connections of thermostats have also been standardized, it being specified that these must conform either to the S. A. E. carbureter flange standard or the S. A. E. clamps and fittings standard for rubber hose.

The first aeronautic standards were put through in very much of a hurry, and it is little wonder that several had to be revised within a year, especially when the intense development in aircraft engineering is considered. This applies to loops and ferrules for round tinned steel wire, loops for single-strand non-flexible steel cable, plain hexagon head bolts, ball hexagon head bolts, castle hexagon nuts and ball hexagon nuts. A standard for plain hexagon nuts was adopted in 1918. All of these airplane parts are for use in wing and body construction only and not for use on aircraft engines.

A considerable amount of standardization work is now in progress and is awaiting action at the coming annual meeting of the Society.

The Electrical Equipment Division has decided to recommend the adoption of two types of cable terminals for ignition distributors, generators, meters and switches. One of these is the spade type, which can be used either straight or with the wire connections set at an angle of 90 deg. to the spade, for use in connection with binding posts having Nos. 8, 10 and 14 machine screw threads. The other type is a flat terminal with the wire coming in at the side, which fits the same sizes of screws. All terminals are to be 1/32 in. thick, to insure proper strength. Another recommendation to be made by the same division is in regard to a sleeve type of starting motor mountings. This mounting is to be used only in connection with an outboard screw shift pinion drive. In the design submitted, a cylindrical portion of the gearshift housing slides into a bored hole in the bell housing. The gear housing is locked in position in the bell housing by means of a set screw with a tapered point. Some attention has also been given to the subject of rating of storage batteries for farm lighting outfits. It is the consenus of opinion that this rating should be based upon an intermittent discharge test.

The engine division has recommended two sizes of rear supporting arms, one to be used with the No. 1 S. A. E. flywheel bell housing, and the other with Nos. 2, 3, 4 and 5. Standardization of the front swivel support is now under consideration. Another standard to be recommended concerns flexible disc magneto couplings. These are to have an outside diameter of disc of 2¾ in. and an inside diameter of 1 in., a diameter of bolt circle of 2 in., a thickness of disc of ¼ in. and four ¼-in. bolts equally spaced.

A sub-division of the Marine Division has evolved standards for swing port lights in five sizes, with air openings of 10, 12, 14, 16 and 18 in. diameter respectively.

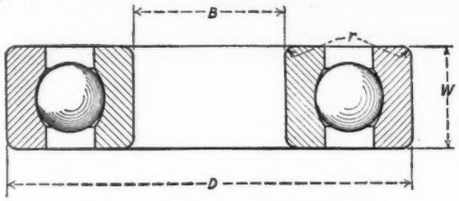
The Miscellaneous Division has under consideration the subject of carbureter hot-air intake sizes, and it is hoped that a report may be made on it at the time of the annual meeting. The division is also revising the aeronautical spark plug shell standard, in order to bring it into harmony with a desired international standard.

The Springs Division, as usual, has been quite active again, and has recommended a number of new spring points, a test for parallelism of spring eye center lines, and revisions of various spring standards.

One of the new divisions of the committee, that of Stationary and Farm Engines, has made some recommendations regarding voltage and capacity ratings of farm lighting outfits. At the present time small generators are generally built to be operated at 1800 r.p.m., while engines of the capacity for farm lighting purposes only run at about 1000 r.p.m. The division considers that it would be of great advantage to purchasers and to the trade as well, if both engines and generators were designed to run at the same speed, so that the generators could be driven directly; and they have recommended that 32 volts be the standard voltage for farm lighting outfits, and recommended various speeds for engines and generators of different output. Flanges for cast iron carbureters and oval and round pipe flanges are other subjects that have received consideration.

The Tire and Rim Division of the committee has been very busy and has taken action on a considerable number of subjects. A table of solid tire sizes has been worked out, to conform to the present table of Class A Pneumatic tire sizes. This includes 15 sizes, ranging from 32 x 3½ to 40 x 14. Other subjects on which action has been taken by this division include base bands for solid tires, industrial truck tires, base bands for industrial truck wheels, allowable tolerances for felloe bands, wood-felloe dimensions for pneumatic tire rims, pneumatic tires for motorcycles, wood spokes for passenger car wheels, valve hole sizes for automobile rims, and solid tire sections and contours.

ANNULAR BALL BEARINGS



HEAVY SERIES—DIMENSIONS

Bearing No.	B Mm.	B Inches	D Mm.	D Inches	W Of Individual Rings Mm.	W Of Individual Rings Inches	r Corner Radius Mm.	r Corner Radius Inches
403	17	0.66929	62	2.44095	17	0.66929	1	0.04
404	20	0.78740	72	2.83465	19	0.74803	2	0.08
405	25	0.98425	80	3.14962	21	0.82677	2	0.08
406	30	1.18110	90	3.54332	23	0.90551	2	0.08
407	35	1.37795	100	3.93702	25	0.98425	2	0.08
408	40	1.57481	110	4.33072	27	1.06299	2	0.08
409	45	1.77166	120	4.72443	29	1.14173	2	0.08
410	50	1.96851	130	5.11813	31	1.22047	2	0.08
411	55	2.16536	140	5.51183	33	1.29921	3	0.12
412	60	2.36221	150	5.90554	35	1.37795	3	0.12
413	65	2.55906	160	6.29924	37	1.45669	3	0.12
414	70	2.75591	180	7.08664	42	1.65355	3	0.12
415	75	2.95277	190	7.48035	45	1.77166	3	0.12
416	80	3.14962	200	7.87405	48	1.88977	3	0.12
417	85	3.34647	210	8.26775	52	2.04725	3	0.12
418	90	3.54332	225	8.85830	54	2.12599	3	0.12
419	95	3.74017	250	9.84256	55	2.16536	3	0.12
420	100	3.93702	265	10.43311	60	2.36221	3	0.12

MEDIUM SERIES—DIMENSIONS

Bearing No.	B Mm.	B Inches	D Mm.	D Inches	W Of Individual Rings Mm.	W Of Individual Rings Inches	r Corner Radius Mm.	r Corner Radius Inches
300	10	0.39370	35	1.37795	11	0.43307	1	0.04
301	12	0.47244	37	1.45669	12	0.47244	1	0.04
302	15	0.59055	42	1.65355	13	0.51181	1	0.04
303	17	0.66929	47	1.85040	14	0.55118	1	0.04
304	20	0.78740	52	2.04725	15	0.59055	1	0.04
305	25	0.98425	62	2.44095	17	0.66929	1	0.04
306	30	1.18110	72	2.83465	19	0.74803	2	0.08
307	35	1.37795	80	3.14962	21	0.82677	2	0.08
308	40	1.57481	90	3.54332	23	0.90551	2	0.08
309	45	1.77166	100	3.93702	25	0.98425	2	0.08
310	50	1.96851	110	4.33072	27	1.06299	2	0.08
311	55	2.16536	120	4.72443	29	1.14173	2	0.08
312	60	2.36221	130	5.11813	31	1.22047	2	0.08
313	65	2.55906	140	5.51183	33	1.29921	3	0.12
314	70	2.75591	150	5.90554	35	1.37795	3	0.12
315	75	2.95277	160	6.29924	37	1.45669	3	0.12
316	80	3.14962	170	6.69294	39	1.53544	3	0.12
317	85	3.34647	180	7.08664	41	1.61418	3	0.12
318	90	3.54332	190	7.48035	43	1.69292	3	0.12
319	95	3.74017	200	7.87405	45	1.77166	3	0.12
320	100	3.93702	215	8.46460	47	1.85040	3	0.12
321	105	4.13387	225	8.85830	49	1.92914	3	0.12
322	110	4.33072	240	9.44886	50	1.96851	3	0.12

LIGHT SERIES—DIMENSIONS

Bearing No.	B Mm.	B Inches	D Mm.	D Inches	W Of Individual Rings Mm.	W Of Individual Rings Inches	r Corner Radius Mm.	r Corner Radius Inches
200	10	0.39370	30	1.18110	9	0.35433	1	0.04
201	12	0.47244	32	1.25984	10	0.39370	1	0.04
202	15	0.59055	35	1.37795	11	0.43307	1	0.04
203	17	0.66929	40	1.57481	12	0.47244	1	0.04
204	20	0.78740	47	1.85040	14	0.55118	1	0.04
205	25	0.98425	52	2.04725	15	0.59055	1	0.04
206	30	1.18110	62	2.44095	16	0.62992	1	0.04
207	35	1.37795	72	2.83465	17	0.66929	1	0.04
208	40	1.57481	80	3.14962	18	0.70866	2	0.08
209	45	1.77166	85	3.34647	19	0.74803	2	0.08
210	50	1.96851	90	3.54332	20	0.78740	2	0.08
211	55	2.16536	100	3.93702	21	0.82677	2	0.08
212	60	2.36221	110	4.33072	22	0.86614	2	0.08
213	65	2.55906	120	4.72443	23	0.90551	2	0.08
214	70	2.75591	125	4.92128	24	0.94488	2	0.08
215	75	2.95277	130	5.11813	25	0.98425	2	0.08
216	80	3.14962	140	5.51183	26	1.02362	3	0.12
217	85	3.34647	150	5.90554	28	1.10236	3	0.12
218	90	3.54332	160	6.29924	30	1.18110	3	0.12
219	95	3.74017	170	6.69294	32	1.25984	3	0.12
220	100	3.93702	180	7.08664	34	1.33858	3	0.12
221	105	4.13387	190	7.48035	36	1.41732	3	0.12
222	110	4.33072	200	7.87405	38	1.49607	3	0.12

INCH TOLERANCES FOR MILLIMETER SIZES

Bore Tolenance in Inches

Bore Mm.	Bore Inches	Bearing Number Light Series	Bearing Number Medium Series	Bearing Number Heavy Series	Tolerance Plus	Tolerance Minus
10 to 55 inc.	0.39370 to 2.16536 inc.	200 to 211 inc.	300 to 311 inc.	403 to 411 inc.	0.0002	0.0004
60 to 80 inc.	2.36221 to 3.14962 inc.	212 to 216 inc.	312 to 316 inc.	412 to 416 inc.	0.0002	0.0005
85 to 110 inc.	3.34647 to 4.33072 inc.	217 to 222 inc.	317 to 322 inc.	417 to 420 inc.	0.0002	0.0006

Outside Diameter Tolerance in Inches

Outside Dia. Mm.	Outside Dia. Inches	Bearing Number Light Series	Bearing Number Medium Series	Bearing Number Heavy Series	Tolerance Plus	Tolerance Minus
30 to 47 inc.	1.18110 to 1.85040 inc.	200 to 204 inc.	300 to 303 inc.	.....	0.0000	0.0005
52 to 140 inc.	2.04725 to 5.51183 inc.	205 to 216 inc.	304 to 313 inc.	403 to 411 inc.	0.0000	0.0008
150 to 265 inc.	5.90554 to 10.43311 inc.	217 to 222 inc.	314 to 322 inc.	412 to 420 inc.	0.0000	0.0012

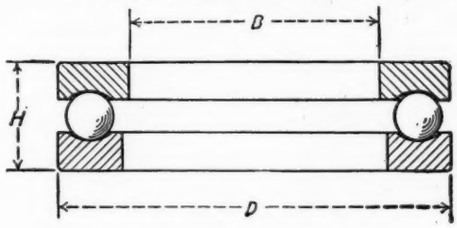
Width Tolerance in Inches

Width tolerance in inches for individual race rings for all sizes of bearings to be plus 0.0000 and minus 0.0050 in.

Eccentricity Tolerance in Inches

Bore Mm.	Bore Inches	Bearing Number Light Series	Bearing Number Medium Series	Bearing Number Heavy Series	Tolerances Inner Race	Tolerances Outer Race
10 to 20 inc.	0.39370 to 0.78740 inc.	200 to 204 inc.	300 to 304 inc.	403 to 404 inc.	0.0006	0.0012
25 to 40 inc.	0.98425 to 1.57481 inc.	205 to 208 inc.	305 to 308 inc.	405 to 408 inc.	0.0008	0.0012
45 to 75 inc.	1.77166 to 2.95277 inc.	209 to 215 inc.	309 to 315 inc.	409 to 415 inc.	0.0010	0.0016
80 to 110 inc.	3.14962 to 4.33072 inc.	216 to 222 inc.	316 to 322 inc.	416 to 420 inc.	0.0012	0.0018

THRUST BALL BEARING TOLERANCES



SINGLE-DIRECTION, FLAT FACE TYPE INCH TOLERANCES FOR MILLIMETER SIZES

Bore Diameter

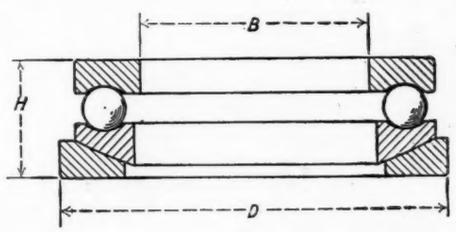
Bore (B) Mm.	Bore (B) Inch	Tolerances, Inch Plus	Tolerances, Inch Minus
0 to 35	0.0000 to 1.3779	0.0008	0.0000
36 to 60	1.4173 to 2.3622	0.0010	0.0000
61 to 110	2.4016 to 4.3307	0.0012	0.0000

Outside Diameter

Diameter (D) Mm.	Diameter (D) Inch	Tolerances, Inch Plus	Tolerances, Inch Minus
0 to 150	0.0000 to 5.9055	0.0000	0.0020
151 to 200	5.9449 to 7.8740	0.0000	0.0030

Total Thickness

Thickness (H) Mm.	Thickness (H) Inch	Tolerances, Inch Plus	Tolerances, Inch Minus
0 to 35	0.0000 to 1.3779	0.0020	0.0020
36 to 100	1.4173 to 3.9370	0.0030	0.0030



SINGLE DIRECTION SELF-ALIGNING TYPE

Bore Diameter

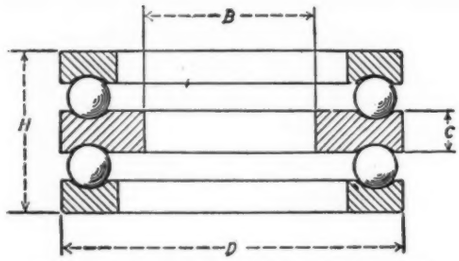
Bore (B) Mm.	Bore (B) Inch	Tolerances, Inch Plus	Tolerances, Inch Minus
0 to 35	0.0000 to 1.3779	0.0008	0.0000
36 to 60	1.4173 to 2.3622	0.0010	0.0000
61 to 110	2.4016 to 4.3307	0.0012	0.0000

Outside Diameter

Diameter (D) Mm.	Diameter (D) Inch	Tolerances, Inch Plus	Tolerances, Inch Minus
0 to 150	0.0000 to 5.9055	0.0000	0.0020
151 to 200	5.9449 to 7.8740	0.0000	0.0030

Total Thickness

Thickness (H) Mm.	Thickness (H) Inch	Tolerances, Inch Plus	Tolerances, Inch Minus
0 to 40	0.0000 to 1.5748	0.0030	0.0030
41 to 100	1.6142 to 3.9370	0.0040	0.0040



TWO-DIRECTION, FLAT-FACE TYPE

Bore Diameter

Bore (B) Mm.	Bore (B) Inch	Tolerances, Inch Plus	Tolerances, Inch Minus
0 to 35	0.0000 to 1.3779	0.0008	0.0000
36 to 60	1.4173 to 2.3622	0.0010	0.0000
61 to 110	2.4016 to 4.3307	0.0012	0.0000

Outside Diameter

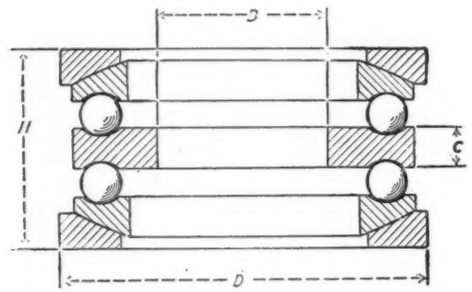
Diameter (D) Mm.	Diameter (D) Inch	Tolerances, Inch Plus	Tolerances, Inch Minus
0 to 150	0.0000 to 5.9055	0.0000	0.0020
151 to 200	5.9449 to 7.8740	0.0000	0.0030

Total Thickness

Thickness (H) Mm.	Thickness (H) Inch	Tolerances, Inch Plus	Tolerances, Inch Minus
0 to 75	0.0000 to 2.9528	0.0040	0.0040
76 to 150	2.9921 to 5.9055	0.0060	0.0060

Thickness of Center Plate

Thickness (C) Mm.	Thickness (C) Inch	Tolerances, Inch Plus	Tolerances, Inch Minus
0 to 10	0.0000 to 0.3937	0.0015	0.0015
11 to 20	0.4331 to 0.7874	0.0020	0.0020
21 to 35	0.8268 to 1.3779	0.0025	0.0025



DOUBLE DIRECTION SELF-ALIGNING TYPE

Bore Diameter

Bore (B) Mm.	Bore (B) Inch	Tolerances, Inch Plus	Tolerances, Inch Minus
0 to 35	0.0000 to 1.3779	0.0008	0.0000
36 to 60	1.4173 to 2.3622	0.0010	0.0000
61 to 110	2.4016 to 4.3307	0.0012	0.0000

Outside Diameter

Diameter (D) Mm.	Diameter (D) Inch	Tolerances, Inch Plus	Tolerances, Inch Minus
0 to 150	0.0000 to 5.9055	0.0000	0.0020
151 to 200	5.9449 to 7.8740	0.0000	0.0030

Total Thickness

	Thickness (H) Mm.	Thickness (H) Inch	Tolerances, Inch Plus	Tolerances, Inch Minus
	0 to 85	0.0000 to 3.3465	0.0060	0.0060
H	86 to 200	3.3858 to 7.8740	0.0080	0.0080

Thickness of Center Plate

Thickness (C) Mm.	Thickness (C) Inch	Tolerances, Inch Plus	Tolerances, Inch Minus
0 to 10	0.0000 to 0.3937	0.0015	0.0015
11 to 20	0.4331 to 0.7874	0.0020	0.0020
21 to 35	0.8268 to 1.3779	0.0025	0.0025

BALL BEARINGS

Temperature for Measurements

These tolerances are applicable only when the bearings and measuring appliances have been brought to a uniform temperature, as for instance 68 deg. Fahr. In case of question as to measurements, gages officially checked by the United States Bureau of Standards shall be considered as final. These tolerances are understood as referring to the dimensions of ball bearings, and not to the dimensions of measuring instruments. When it is desired to measure bearings by the use of maximum and minimum gages, the dimensions of the maximum gage shall be 0.0001 in. over the maximum bearing dimension, and the dimension of the minimum gage shall be 0.0001 in. under the minimum bearing dimension.

The above paragraph specifying the temperature at which tolerances are applicable to bearings and measuring appliances applies both to annular (radial) ball bearing tolerances and thrust bearing tolerances.

Definition of Eccentricity.

The eccentricity of the inner race is that lack of running truth noticed upon the stationary outer race when rotating the inner race and balls upon true centers.

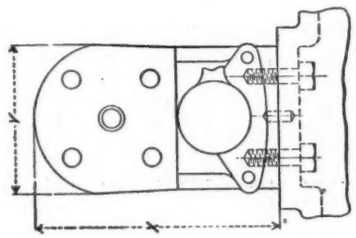
The eccentricity of the outer race is that lack of running truth shown upon a suitable indicator during the rotation of the outer race and balls upon the inner race fixed upon a stationary arbor.

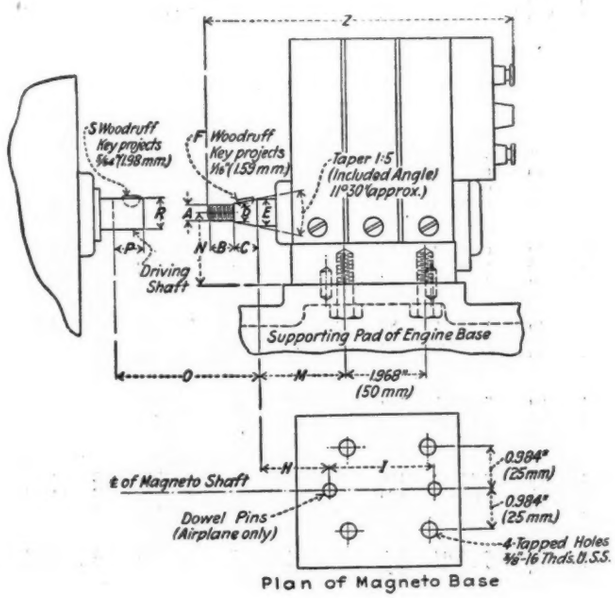
MAGNETO DIMENSIONS

Airplane, Automobile, Marine, Motorcycle, Tractor

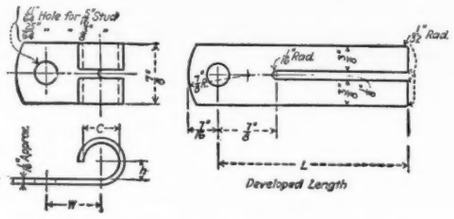
		4 and 6 Cyl. Inch	4 and 6 Cyl. Mm.	8 and 12 Cyl. Inch	8 and 12 Cyl. Mm.	Motorcycle Inch	Motorcycle Mm.
A		⅛"-16 thds.	9.53-1.58	⅛"-16 thds.	9.53-1.58	5/16"-18 thds.	7.94-1.41
U. S. S. Threads							
B		.5905	15	.5905	15	.4170	10.59
C		.590	14.98	.590	14.98	.3543	9
D		.472	12	.472	12	.4409	11.20
E		.590	14.98	.590	14.98	.5118	13
F		No. 3	No. 3	No. 3	No. 3	Special	Special
Woodruff Key (Dia. X thickness)		1/2x1/8	12.7x3.18	1/2x1/8	12.7x3.18	5/16x5/32	7.94x2.38
H		No std.	....	1.693	43	No std.	....
I		No std.	....	2.519	63.98	No std.	....
M		2.086	52.98	2.086	52.98	1.553	39.45
N		1.771	44 98	1.968	50	1.771	44.98
*‡O		2.375	60.32	2.375	60.32	No std.	....
*‡P		.75	19.05	.75	19.05	No std.	....
*†‡R (limits)		.750 .749	19 05 19 02	.750 .749	19.05 19.02	No std.	....
Coupling Bore (limits)		.7505 .7495	19 06 19.04	.7505 .7495	19.06 19.04	No std.	....
‡S Woodruff Key (Dia. X thickness)		No. 8 1/4x1/32	No. 8 19.05x3.97	No. 8 1/4x1/32	No. 8 19.05x3.97	No std.	....
Magneto Space Max.)	X	8.000	203.20	9.000	228.60	6.000	152.40
	Y	5.000	127.00	5.000	127.00	3.750	95.25
	Z	10.000	254.00	10.000	254.00	6.375	161.93
Width at Brushes	W	No std.	....	No std.	....	4.000	101.60
Adv. Lever Rad.		2.125	53.97	No std.	....	1 968	50
Timing Lever Holes	Tapped S.A.E.	1/4"-28 thds.	6.35-.9 Mm p'ch	No std.	....	No std.	....
	Plain	25	6.35	No std.	....	.2185	5.55
Dowels (Airplane Only)	Diam.	1/16 +.002 -.002	7 94 + 05 - 00	1/16 +.002 -.000	7.94 +.05 -.00	No std.	....
	Depth	1/16	7 94	1/16	7.94	No std.	....

*Provides for Impulse Couplings for tractors. Conforms to National Gas Engine Association standard.
†Recommended material for drive-shaft is selected cold-rolled stock.
‡Not for use in airplanes.





Plan of Magneto Base



CABLE TERMINALS FOR STARTING MOTORS.

Terminal No.	C	h	W	L
1	17/32	17/64	13/16	2 3/16
0	13/32	19/64	27/32	2 5/16
00	21/32	21/64	⅞	2 ½

Dimensions in inches.

Materials

The materials recommended for cable terminals for starting motors are: Tinned copper, tinned brass, or zinc-coated steel.

CABLES FOR STARTING MOTORS

*Cable Size	Max. Cable Length, Ft.
SB-1	5
SB-0	7
SB-00	9

The three sizes of cables for starting motors given above are considered sufficient to cover all usual 6-volt requirements. The cable lengths specified are based on an allowable drop of 0.3 volt at 500 amperes.

*"SB" indicates Single Braid.

STARTING MOTOR PINION

Flywheel starting motors shall be equipped with an 8-10 pitch, 11-tooth, 20-deg. pressure angle pinion. The pitch line clearance between pinion and flywheel shall be 0.015 inch.

STARTING SWITCH LOCATION

Starting switches shall be located on the chassis so as to facilitate electrical assembly and testing on chassis.

IGNITION DISTRIBUTOR MOUNTING

The ignition distributor mounting dimensions shown are suitable for use when the distributor is mounted on either the generator or the engine.

BRACKET MOUNTING FOR GENERATORS

This specification is complete in regard to mounting dimensions of the generator. Bracket dimensions and the dimensions and location of the pad on the crankcase are now being determined.

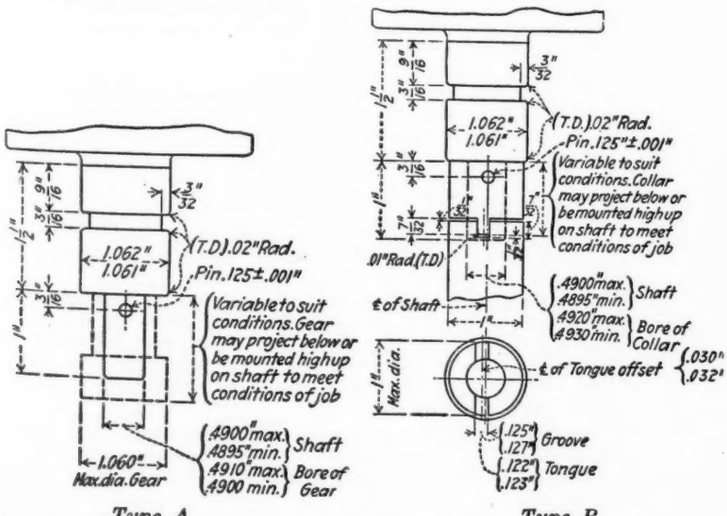
GENERATOR SHAFT-END FOR COUPLING DRIVE

The shaft-end illustrated under Bracket Mounting for Generators is considered of ample capacity for all sizes of generators, except in special instances where small generators, naturally not suited to this Standard, may be fitted with the standard magneto shaft-end in accordance with present practice.

FLANGE MOUNTINGS FOR STARTING MOTORS

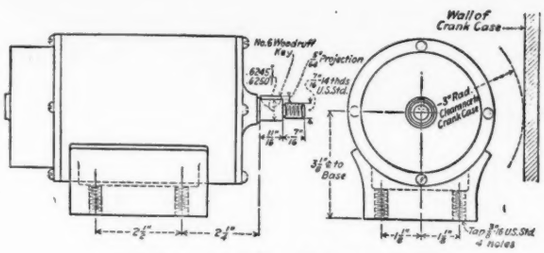
Size No.	A	B	C	D	E
1	2⅜	2½	13/32	9/16	3.496 to 3.499
2	2 11/16	2⅞	13/32	9/16	3.621 to 3.624
3	2 13/16	3⅛	15/32	19/32	3.621 to 3.624

These standard flanges may be used for either right-hand or left-hand mounting of motors.



Type A *Type B*

Ignition distributor mounting



Bracket mounting for generators

SPARK CONTROL—MOTORCYCLE

Spark control on military motorcycles shall be of the handle bar grip type placed on the left side and arranged to advance the spark by turning top of the grip toward the center.

THROTTLE CONTROL—MOTORCYCLE

Throttle control on military motorcycles shall be of the handle bar grip type, placed on the right side and operate to open the throttle by twisting the top of the grip toward the center.

KICK STARTERS—MOTORCYCLE

Kick starters on military motorcycles shall be of the folding pedal type and operate by pushing down and back.

Starters cannot be confined to a definite side until further standardization takes place on engines.

CLUTCH PEDAL—MOTORCYCLE

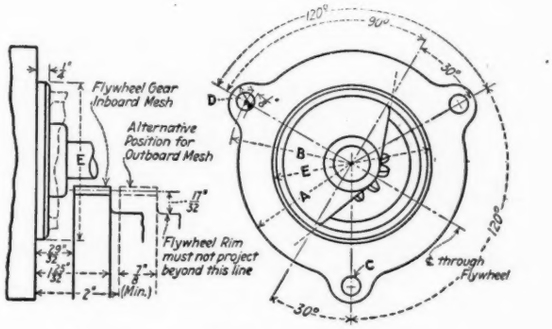
Clutch pedal on military motorcycles shall be placed on the left side and operate to release the clutch by pushing forward and down, clutching by reverse action.

BRAKE PEDAL—MOTORCYCLE

Brake pedal on military motorcycles shall be placed on the right side and operate to apply the brake by pushing down.

OIL AND GREASE CUPS—MOTORCYCLE.

Oil and grease cups on military motorcycles shall have an attaching diameter of 5/16 inch, 32 threads.



Flange mounting for starting motors

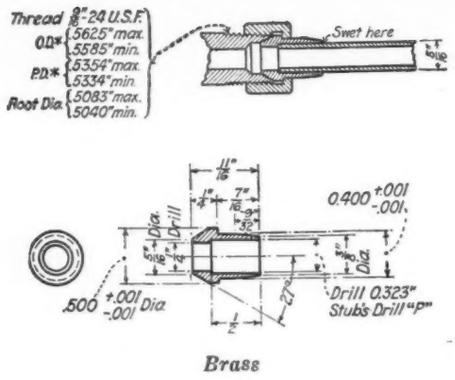
CLAMPS AND FITTINGS FOR RUBBER HOSE

Inside Hose Diameter	Outside Diameter of Hose and Extended Inside Diameter of Clamps: Single-ply	Two-ply	Three-ply	Four-ply	Length of Fitting for Lap of Hose
3/16	7/16	½	9/16	⅝	1
¼	½	9/16	⅝	11/16	1
5/16	9/16	⅝	11/16	¾	1
⅜	⅝	11/16	¾	13/16	1
½	¾	13/16	⅞	15/16	1
¾	1	1 1/16	1⅛	1 3/16	1
1	1¼	1 5/16	1⅜	1 7/16	1¼
1¼	1½	1 9/16	1⅝	1 11/16	1¼
1½	1¾	1 13/16	1⅞	1 15/16	1¼
1¾	2	2 1/16	2⅛	2 3/16	1¼
2	2¼	2 5/16	2⅜	2 7/16	1¼
2¼	2½	2 9/16	2⅝	2 11/16	1¼
2½	2¾	2 13/16	2⅞	2 15/16	1½
3	3¼	3 5/16	3⅜	3 7/16	1½

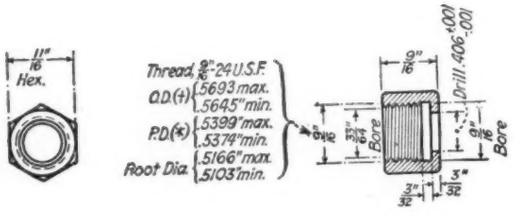
Limits on inside diameter of hose ± 1/64. Limits on thickness of hose (not measured at lap) ± 1/64. All dimensions in inches.

CLAMPS AND FITTINGS FOR RUBBER HOSE—AERONAUTIC

In order to comply with present practice and utilize existing hose connections, the list of sizes shown above are recommended for aeronautic practice.



Brass



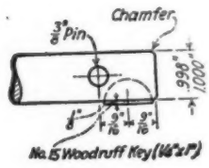
Steel—copper and white nickel plate

*Actual size.
†Minimum diameter for respective pitch diameters. Outside diameter tolerances of commercial taps are slightly greater.

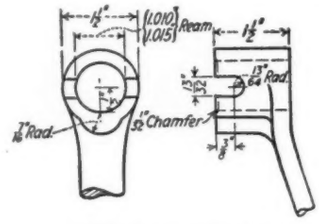
MOTORCYCLE FUEL AND LUBRICATION PIPE FITTINGS

Fuel and lubrication pipes on military motorcycles shall be 5/16 in. outside diameter and the fittings shall be of the soldered type with 9/16 in. nut, 24 threads, United States Form.

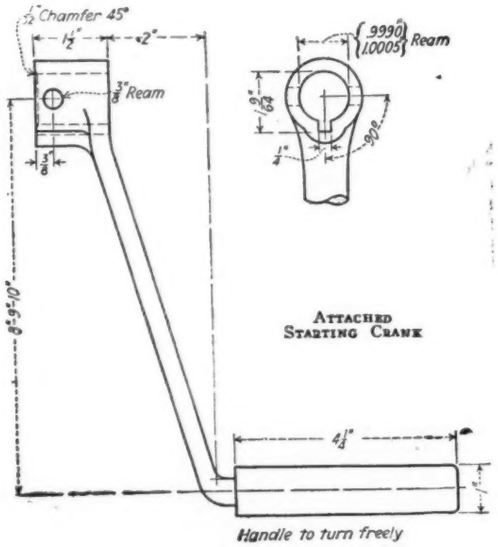
Outside diameter tolerances of commercial taps are slightly greater.



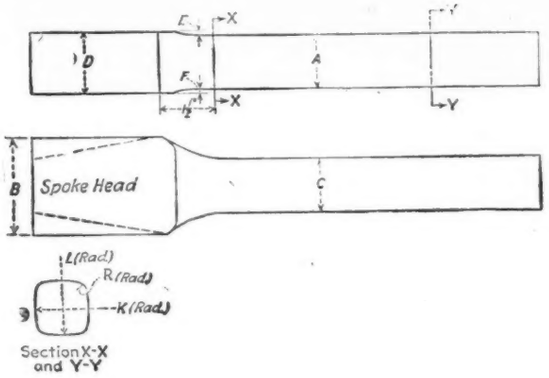
SHAFT END



REMOVABLE CRANK



Hand-starting crank, attached



WOOD SPOKE DIMENSIONS, COMMERCIAL VEHICLE WHEELS

Spoke Symbol Numbers	Nominal Spoke Size, Thickness Between Flanges (D)	Size of Finished Barrel A	B	C	E	F	K	L	R	Max. Flange Diameter 12 Spokes	14 Spokes	16 Spokes
1425	1 1/2	1 1/2	2 5/8	1 1/2	1/8	1/8	3 1/2	3 1/4	1/16	9 1/2	11	12 1/2
1625	1 5/8	1 5/8	2 5/8	1 5/8	1/8	1/8	2 15/16	2 15/16	1/16	10	11 1/2	13 1/4
2026	2	2	2 5/8	2	1/8	1/8	5 5/8	5 5/8	1/8	10	11 1/2	13 1/4
2230	2 1/4	2 1/4	3	2 1/4	3/32	3/32	3 11/16	3 11/16	1/8	10 3/8	12 1/2	14 1/4
2430	2 1/2	2 1/2	3	2 1/2	3/32	3/32	3 5/16	3 5/16	1/8	10 3/8	12 1/2	14 1/2
2632	2 3/4	2 3/4	3 1/4	2 1/2	3/32	3/32	3 1/2	10 3/8	1/8	11 1/8	13 1/2	15 1/2
3032	3	3	3 1/4	2 1/2	3/32	3/32	3 1/2	10 3/8	1/8	11 1/8	13 1/2	15 1/2
3432	3 1/2	3 1/2	3 1/4	2 1/2	3/32	3/32	7 1/2	10 1/2	1/16	11 1/8	13 1/2	15 1/2
4032	4	4	3 1/4	3	3/32	3/32	7 1/8	12 3/8	1/8	11 1/8	13 1/2	15 1/2
4432	4 1/2	4 1/2	3 1/4	3	3/32	3/32	7 1/8	12 3/8	1/8	11 1/8	13 1/2	15 1/2
5032	5	5	3 1/4	3	3/32	3/32	10 1/2	17 1/16	1/2	11 1/8	13 1/2	15 1/2

Wood Spokes for Commercial Vehicle Wheels

The first two figures of the symbol number indicate the finished size of barrel (thickness between flanges); and the second two figures indicate the dry width of head. The first figure of each pair indicates whole inches, and the second indicates eighths of an inch; thus 1425 indicates 1½-in. barrel and 2⅝-in. head.

Radial allowance above flange diameters

⅛ in., up to and including 9-in. flanges
3/16 in., from 9 in. to 11½-in. flanges, inclusive
¼ in., above 11½-in. flanges

TACHOMETER DRIVE

Instrument End—The upper or instrument end of the shaft has a squared socket, made integral with a shoulder which forms a thrust bearing.

Engine End—The lower or engine end is finished with a cylindrical end with a single integral key.

Casing—The casing is to be of flexible metallic tubing, covered with whipcord braid and impregnated to prevent oil leakage; similar to sample, or covered with other material which will be equally flexible, oil tight and free from stretching and of no greater weight than the whipcord braid covering casing. The outside diameter of casing to be over braid to be approximately 7/16 in.; the inside diameter of casing to be approximately ¼ in. The ends of the casing are finished alike, as shown in detailed sketches. The screw-threaded sockets covering the whipcord braid are screwed in place and set with shellac or other suitable material to form an oil-tight and permanent connection.

Shaft End—The shaft end at the engine is drilled and slotted to fit the tachometer shaft end, allowing for end-play of at least 1 in. More play than this may be required where the drive shaft is more than 6 ft. in length, the amount to be determined experimentally.

Drive Shaft—Drive shaft to be of helical wire wound construction, with core wires.

Spindle—The tachometer spindle is finished square to fit the square socket on the drive shaft.

Drive Shaft—Drive shaft will rotate at one-half crank shaft speed.

End Nuts—Size and contour of exterior circumference of end nuts optional, but 15/16 octagon recommended.

TRACTOR SPECIFICATION

CONDENSED

S. A. E. Recommended Practice

1. Firm name .....
   Address .....
2. Tractor trade name and model.....
3. Drawbar horsepower, S. A. E. tractor rating.....
   Old trade rating.....
4. Belt horsepower, S. A. E. tractor rating.....
   Old trade rating.....
5. Engine: Make.....Bore.....Stroke.....
   No. cylinders.....Cycle.....Normal R.P.M.....
   Lubricating system, type.....
   Ignition .....Carbureter.....
   Fuel system .....
   Cooling system .....
   Belt pulley dia.....Face.....R.P.M.....
6. Transmission, type or make.....
   No. speeds forward .....
   Speed M.P.H. at normal engine speed—
   1st .....2d .....3d .....
   Indicate by check (X) speed normally used for plowing.
7. Wheels: No.....Arrangement .....
   Driving, No..... Dia.....Face.....
   Non-driving, No..... Dia.....Face.....
   If track laying type, No. of tracks.....
   Length .....Face.....
8. Frame construction .....
9. Wheel base .....Tread.....
10. Width overall.....Length overall.....
11. Turning radius ½ diameter largest track circle.....
12. Weight of tractor less fuel, oil, water and lugs.....
13. Shipping weight, including standard equipment and stays.....
    Dimensions to be given in inches.

TRACTOR SPECIFICATION

COMPLETE

1. Firm name .....
   Address .....
   Trade name .....Model.....
2. Horsepower rating:
   (a) Drawbar (old trade) .....S. A. E.....
   (b) Belt (old trade).....S. A. E.....
3. Engine .....
   Make .....
   Model .....
4. Number of cylinders.....Cycle.....
5. Engine. Type (*mark* ×)

	(Cyl. how cast)	
Vertical	Valve-in-head	Individual .....
Horizontal	L-head	Pairs .....
Opposed	T-head	In block .....
Removable head.....	Removable cylinder sleeve.....	

6. Bore.....in. Stroke .....in.
7. Compression.....lb. gage pressure.
8. Normal R.P.M.....
9. Valves. Make.....Type .....
   Diameter, inlet valve, clear....in.; inlet valve, lift....in.
   Diameter, exhaust valve, clear..in.; exhaust valve, lift..in.
   Valves. Material .....
10. Valve spring pressure at closed position.
    Intake.....lb. Exhaust .....lb.
11. Piston weight with rings.....lb.....oz.
    Piston material .....
12. Piston clearance (for diameters).
    First land.....in. Third land.....in.
    Second land .....in. Skirt .....in.
13. Piston rings. Number.....Width.....in.
    Make or type.....
    *Expansion pressure.....oz.
14. Piston rings. Diameter.....Wall thickness.....
15. Oscillating bearing. Length.....
16. Piston-pin bearing. Type (*mark* × *for a, b, or c*).
    (a) Bearnig in piston bosses.....
    (b) Bearing in connecting-rod end.....
    (c) Bearing in both.....
    Method of holding piston pin.....
17. Governor: Make.....Type..... { Open..... / Enclosed.....
18. Connecting-rod. Length (c to c).....in.
    Bearing cap bolts: No.....Dia.....in.
    Connecting-rod bearing: { Type.....Make..... / Diameter.....in. Length....in. / Material.....
    Weight of connecting-rod complete with all bolts, nuts, bearings and piston-pin in place.....lb.....oz.
19. Crankshaft: Kind of steel.....Heat-treatment.....
20. Main crankshaft bearings. Number..... Type.....

Dimensions of Each Bearing.

	Diameter	Length	Material
Front	in.	in.	
Second	in.	in.	
Middle	in.	in.	
Fourth	in.	in.	
Rear	in.	in.	

(Rear is flywheel end)

21. Flywheel. Diameter.....in. Weight.....lb.
22. Method of attaching (*mark* ×):
    Flange .....Taper.....Straight.....
23. Cams (*mark* ×):
    Integral .....Separate.....
24. Camshaft bearings. Number.....

	Diameter	Length	Material
Front	in.	in.	
Second	in.	in.	
Middle	in.	in.	
Fourth	in.	in.	
Rear	in.	in.	

*Give pressure in ounces, as applied on the diameter 90-deg. distant from the diameter through the saw cut, which will just bring the ends of the ring together.

25. Timing gears (*mark* × *for a or b*):
    (a) Spur.....(b) Helical .....
    Crankshaft gear material.....
    Camshaft gear material .....
26. Engine weight, complete with carbureter and ignition equipment.....lb.
27. Lubrication system (*mark* × *except in g*):
    (a) Circulating..... (f) Drilled crankshaft .....
    (b) Non-circulating..... (g) Mechanical lubricator ....
    (c) Pressure feed ..... Make .....
    (d) Gravity feed ..... (h) Rink type .....
    (e) Splash .....
28. Lubricating camshaft (*mark* ×):
    Independent lead.....Pressure.....Splash.....
29. Piston lubrication (*mark* ×):
    Splash .....Pressure .....
30. Lubricating oil capacity.....gal.
31. Oil-pump type (*mark* ×):
    Plunger .....Gear .....Individual.....
32. Oil-pump location .....
33. Ignition system. Make.....
    Type (*mark* ×):
    Magneto .....H.T.....L.T.....Direct. of Rot.....
    Impulse coupling.....Make .....
    Battery .....Make.....Type.....Volts.....Amp. hrs.....
34. Starting device .....Make .....Volts.....
35. Spark-plugs. Make.....Size .....Type { Extension.... / Standard.....
36. Carbureter. Make.....Model.....Size.....
37. Exhaust—heat used for (*mark* ×):
    Air.....Fuel.....
    Mixture in carbureter.....Mixture in manifold.....
38. Hot-water jacket on (*mark* ×):
    Carbureter .....Manifold.....
39. Water injected with fuel—Yes.....No.....
40. Fuel supply. Type (*mark* ×):
    (a) Gravity.....
    (b) Pump .....
    (c) Vacuum tank .....
41. Fuel tanks. Number.....
    Capacity, gal.....gasoline.
    Capacity, gal.....kerosene.
42. Air cleaner. Make.....Size.....
    (*mark* ×) (a) Dry..... (b) Water.....
43. Radiator. Make.....
    Core: { Height .....in. / Width .....in. / Thickness .....in. / Sectional .....in.
44. Cooling system. Capacity.....gal.; cooling fluid.....
45. Cooling system. Circulation:
    Thermosyphon .....
    Type .....
    Pump: Delivery, gal. per minute at normal R.P.M.....
46. Cooling system. Air circulation:
    Exhaust .....Make .....
    Fan ..... { Diameter.....in. / Normal engine speed.....R.P.M. / Type of drive .....
47. Belt pulley. Make.....R.P.M.....
    Material .....
    Diameter .....Face.....
48. Belt-pulley drive. Type (*mark* ×):
    Gear .....Direct.....
    Equipped with independent clutch.....
    Brake .....
49. Belt-pulley bearings. Make.....
    Type (*mark* ×):

	Bore	O. D.	Width
Roller	.....	.....	.....
Ball	.....	.....	.....
Plain	.....	.....	.....

50. Transmission. Make.....Type, open.....Enclosed.....
51. Clutch. Type:
    Transmission .....Make.....Size...in.
    Belt .....Make.....Size...in. Ply.....
52. Reductions (pairs of gears) engine to drive wheel, No.....

Reduction	Type of Gearing	Pitch	Face	Material	Finish	Heat Treatment
1st	.....	.....	.....	.....	.....	.....
2nd	.....	.....	.....	.....	.....	.....
3rd	.....	.....	.....	.....	.....	.....
Final reduction....	.....	.....	.....	.....	.....	.....
Reverse	.....	.....	.....	.....	.....	.....

Shaft Bearings

	Type	Bore	Outside Diameter	Width	Material
1st shaft	.....	.....	.....	.....	.....
2nd shaft ..	.....	.....	.....	.....	.....
3rd shaft....	.....	.....	.....	.....	.....
4th shaft ...	.....	.....	.....	.....	.....
Reverse	.....	.....	.....	.....	.....

53. Differential. Open.....Enclosed.....Make.....
54. Differential gearing. Type (*mark* ×):
    Bevel .....
    Spiral .....
    Spur .....
    Material .....
    Interlocking .....
    Finish .....
55. Differential main bearings. Make.....
    Type (*mark* ×):

	Bore	O. D.	Width
Roller	.....	.....	.....
Ball	.....	.....	.....
Plain	.....	.....	.....
Thrust bearing. Make.....		Type.....	

56. Locking differential. Yes.....No.....
57. Final drive. Type (*mark* ×):
    Through axle ..... { Gear.....
    Through spokes ..... / Chain.....
    Through rim .....

58. Traction speeds at normal engine R.P.M.:
(Also mark by × speed normally used for plowing.)

Speed	M.P.H.
1st (..)	
2nd (..)	
3rd (..)	
4th (..)	
Reverse	

59. Driving wheels. Number.....
Cast solid .....
Section of spoke.....sq. in. Shape of section.....
Built-up or cast in.....
Dia.....in. Face.....in.
Note—If tracklaying type, No. of tracks.....
Length.....in. Face.....in.

60. Drive-wheel axle. Type and mounting (*mark* ×):
Stationary ..... Spring .....
Live ..... Rigid .....
Dia. .....in. Material .....
Bearings, Make .....
Type (*mark* ×):

	Bore	O. D.	Width
Roller	.....	.....	.....
Ball	.....	.....	.....
Plain	.....	.....	.....

61. Non-drive wheels. Number.....
Cast solid .....
Section of spokes.....sq. in. Shape of section.....
Built-up or cast in.....
Dia.....in. Face.....in.

62. Guide wheels. Number.....Dia.....in.....Face.....in.
Position .....Mounting ..... { Spring..... / Rigid .....
Spindle dia.....Material .....
Spindle bearings. Make.....
Type (*mark* ×):

	Bore	O. D.	Width
Roller	.....	.....	.....
Ball	.....	.....	.....
Plain	.....	.....	.....

63. Steering arrangement { Knuckle type ..... / Swinging axle.....
Reversible .....Irreversible .....

64. Static weight on wheels (without water, fuel or oil):
On non-drive .....lb. On drive wheels.....lb.
.....lb. .....lb.

65. Frame. Type (*mark* ×):
Pressed .....Make.....
Structural .....Material.....
Cast .....

66. Side members shape and size.....

67. Wheelbase c to c of front and rear wheels.....ft.....in.
Gage .....ft.....in.
(a) Total width over all.....ft.....in.
(b) Total width over rims.....ft.....in.
Length over all.....

68. Turning radius (one-half diameter greatest track circle).....

69. Drawbar height. High.....Low.....
(S. A. E. Standard, 17 in.)

70. Drawbar swivelled. Yes.....No.....

71. Extension rims. Width.....in.

72. Lugs. Type .....Size.....

73. Clearance at lowest point.....in.

74. Total weight of tractor (less fuel, oil, water and lugs).....lb.

75. Domestic shipping weight including standard equipment and blocking.....lb.

76. Boxing for export. Number of boxes.....
For cubical contents and weight of each box:

Box No.	Contents, Cu. Ft.	Weight, Lb.
1.....	.....	.....
2.....	.....	.....
3.....	.....	.....
4.....	.....	.....
5, etc.....	.....	.....

TRACTOR DRAWBAR RATING

The drawbar rating shall be 80 per cent of the horsepower that the tractor is guaranteed to develop at the drawbar continuously for two hours, the tractor being in good condition and properly operated at rated engine speed. The tests should be taken on ground sufficiently firm to give the traction wheels a good footing, a firm sod being preferable.

HEIGHT OF TRACTOR DRAWBAR

The standard height of drawbar shall be 17 in. for both plowing and other work.

PLOWING SPEED

The standard tractor speed for plowing shall be 2½ m.p.h. for tractors of 15 drawbar hp. and under.

MAGNETO DIMENSIONS

Magnetos for tractors shall be made to S. A. E. Standard dimensions as shown in S. A. E. Handbook, Vol. I, pages 36 and 36xa.
The magneto drive shaft on the engine shall be 0.750 in. diameter, the magneto coupling to be attached to this shaft by a key and pin.

TRACTOR BELT POWER RATING

The belt horsepower rating shall be 80 per cent of the horsepower the engine is guaranteed to deliver at the belt pulley continuously for two hours, the engine being in good condition and properly operated at rated speed.

TRACTOR BELT SPEED

A belt speed of 2600 ft. per min. at the crown of the pulley shall be used for all tractors, this being a speed which will meet the widest range of conditions.

TRACTOR BELT AND PULLEY WIDTHS

Belt pulleys for tractors shall be as large as possible, and the widths vary according to the horsepower delivered, as shown in the following table:

Horsepower	Pulley Widths, In.	Max. Belt Widths, In.
Under 20	6½	6
20 to 30 inc.....	7½	7
Above 30.....	To be determined	

It is intended that the maximum belt widths shall be ½ in. less than pulley widths

S. A. E. STEELS FOR TRACTORS

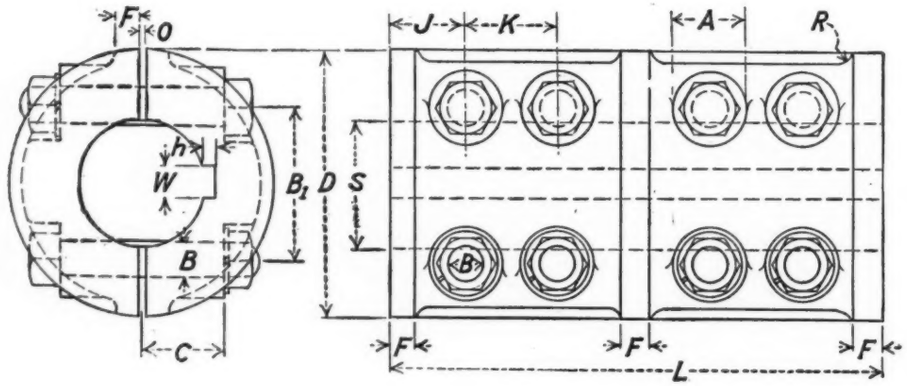
S. A. E. Steel No. 1020 is recommended for all ordinary hot and cold-rolled shafting, gear blanks and shapes; also for cold-rolled bars for general use.
S. A. E. Steel No. 1045 is recommended for all hot and cold-rolled special shafting where a hard surface is needed.

TRACTOR SCREWS AND BOLTS

In tractor engines, S. A. E. Standard screws for tapped holes shall be used, except in soft material such as cast-iron, brass, bronze or aluminum, where U. S. Standard screws shall be used.
In general tractor construction bolts and screws of the U. S. or S. A. E. Standard pitches, with square or hexagon heads, shall be used. They shall be limited to ⅛-in. steps above ½-in. diameter, and 1/16-in. steps below ½-in. down to and including ¼-in. diameter.

TRACTOR CARBURETER FLANGES

All oversize carbureters shall be equipped with the next size larger S. A. E. Standard flange than the flange standardized for the nominal carbureter opening. (For example, on a 1⅜-in. oversize carbureter, the flange shall be the same as for the 1½-in. nominal.)



Marine shaft coupling
(*See table on page* 165)

Dimensions for Marine Drive Shaft Couplings

Size No. (See Note)	S	Keyway W	Keyway h	Clamp L	Clamp D	Clamp F	Clamp A	Clamp C	Clamp R	Clamp O	Bolts, S. A. E. No.	Bolts, S. A. E. *B	Bolts, S. A. E. †Thds. S.A.E.	Bolts, S. A. E. B_1	Bolts, S. A. E. J	Bolts, S. A. E. K
PS- 8	1	1/4	1/8	5	2 3/4	1/4	7/8	3/4	1/8	1/8	8	5/8	24	1 11/32	13/16	1
PS- 9	1 1/8	1/4	1/8	5	2 3/4	1/4	7/8	3/4	1/8	1/8	8	7/16	20	1 13/32	13/16	1
PS-10	1 1/4	5/16	5/32	6	3	5/16	1 5/16	1 3/16	5/32	1/8	8	7/16	20	1 5/16	1 5/16	1 5/16
PS-11	1 3/8	3/8	5/16	6	3	5/16	1 5/16	3/8	5/32	1/8	8	7/16	20	1 11/16	1 5/16	1 5/16
PS-12	1 1/2	3/8	5/16	6	3 3/8	5/16	1 5/16	7/8	5/32	1/8	8	1/2	20	1 3/8	1 5/16	1 1/4
PS-13	1 5/8	7/16	3/32	7	3 1/2	7/16	1 5/16	1	7/32	1/8	8	1/2	20	2	1 1/8	1 1/2
PS-14	1 3/4	7/16	7/32	7	4	7/16	1 5/16	1 1/16	7/32	1/8	8	9/16	18	2 1/16	1 1/8	1 1/2
PS-15	1 7/8	1/2	1/4	8	4	7/16	1 5/16	1 1/8	7/32	1/8	8	5/8	18	2 1/8	1 5/16	1 5/8
PS-16	2	1/2	1/4	8	4 3/8	7/16	1 5/16	1 3/16	7/32	1/8	8	5/8	18	2 1/2	1 5/16	1 5/8
PS-18	2 1/4	5/8	5/16	9	5 1/4	9/16	1 1/2	1 5/16	9/32	1/8	8	3/4	16	2 13/16	1 7/16	1 7/8
PS-20	2 1/2	5/8	5/16	10	5 1/2	5/8	1 1/2	1 7/16	9/16	1/8	8	3/4	16	3 1/16	1 5/16	2 1/8
PS-22	2 3/4	3/4	3/8	11	6	1 1/16	1 3/4	1 9/16	5/8	1/8	8	7/8	14	3 3/8	1 3/4	2 5/16
PS-24	3	3/4	3/8	12	6 1/4	3/4	1 3/4	1 11/16	5/8	5/16	8	7/8	14	3 5/8	1 15/16	2 1/2
PS-26	3 1/4	7/8	7/16	12 1/2	6 3/4	1 5/16	1 3/4	2 1/4	7/16	5/16	8	7/8	14	3 7/8	2 1/16	2 5/16
PS-28	3 1/2	7/8	7/16	14	7	1/8	2	2 5/8	7/16	5/16	8	1	14	4 1/8	2 1/4	3 1/16
PS-32	4	1	1/2	18	8 1/4	1/4	2	2 7/8	1/2	1/4	12	1	14	4 3/4	2 5/8	2 5/8

SHAFT COUPLING

Dimensions in inches.

NOTE.—In column "Size No." P indicates Propeller Shaft, S indicates Steel, and the figures number of eighths of an inch in shaft diameters.

*Figures in column indicate bolt diameters. Use clearance drill of same nominal size for holes B.

†All threads to be S. A. E. pitch, U. S. Form.

REVERSE COUPLING—CAST IRON

(T. D.) indicates Tooling Dimension. Dimensions in inches.

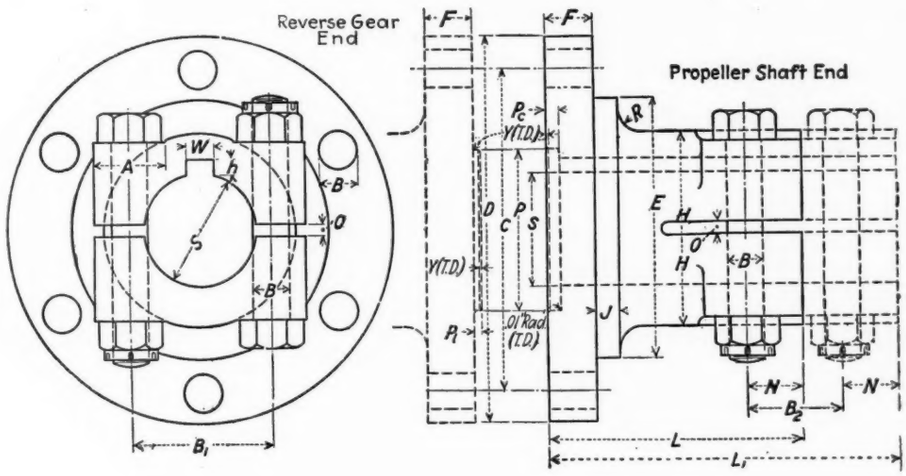
NOTE.—In column "Size No." R indicates Reverse Gear, P indicates Propeller Shaft, C indicates Cast Iron, and the figures number of eighths of an inch in shaft diameters.

*Pilot tolerance, + 0.000, — 0.001 in. Pilot recess tolerance, + 0.001, — 0.000 in. per inch diameter.

†Figures in column indicate bolt diameters. Use clearance drill of same nominal size for holes B in flange.

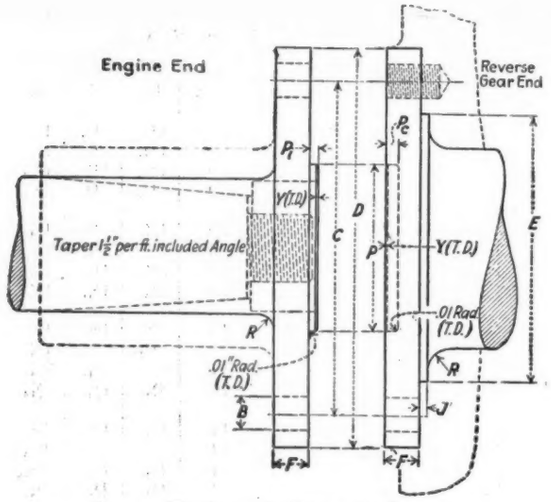
‡All threads to be S. A. E. pitch, U. S. Form.

Marine reverse gear cast-iron coupling (See table below)



Size No. (See Note)	S	Keyway W	Keyway h	Flange D	Flange E	Flange F	Flange J	Pilot *P	Pilot P_1	Pilot P_c	Pilot Y	Hub H	Hub L	Hub L_1	Hub N	Hub B_1	Hub B_2	Hub R	Hub O	Hub A	Bolts, S. A. E. No.	Bolts, S. A. E. †B	Bolts, S. A. E. ‡Thds. per In.	Bolts, S. A. E. C
RPC- 6	5/8	5/16	3/32	4	2 1 3/32	1/2	1/4	1 1/8	1/16	1/8	1/64	2	2	....	5/8	1 1/16	....	1/4	1/8	3/4	4	5/8	24	3
RPC- 7	7/8	5/16	3/32	4	2 1 3/32	1/2	1/4	1 1/8	1/16	1/8	1/64	2	2	....	5/8	1 1/16	....	1/4	1/8	3/4	4	5/8	24	3
RPC- 8	1	1/4	1/8	4	2 1 3/32	1/2	1/4	1 1/8	1/16	1/8	1/64	2	2	....	5/8	1 5/32	....	1/4	1/8	3/4	4	5/8	24	3
RPC- 9	1 1/8	1/4	1/8	5	3 1 1/32	5/8	5/16	2	1/8	5/16	1/32	2 1/2	2 1/2	....	3/4	1 1 3/32	....	5/16	5/32	7/8	6	7/16	20	4
RPC-10	1 1/4	5/16	5/32	5	3 1 1/32	5/8	5/16	2	1/8	5/16	1/32	2 1/2	2 1/2	....	3/4	1 5/16	....	5/16	5/32	7/8	6	7/16	20	4
RPC-11	1 3/8	3/8	7/16	5	3 1 1/32	5/8	5/16	2	1/8	5/16	1/32	2 1/2	2 1/2	....	3/4	1 1 1/16	....	5/16	5/32	7/8	6	7/16	20	4
RPC-12	1 1/2	3/8	7/16	6	4 1 1/16	3/4	3/8	2 1/2	1/8	5/16	1/32	3	....	4	7/8	1 1 1/16	1 1/2	3/8	5/16	1 1/8	6	9/16	18	5
RPC-13	1 5/8	7/16	7/32	6	4 1 1/16	3/4	3/8	2 1/2	1/8	5/16	1/32	3	....	4	7/8	2 1/16	1 1/2	3/8	5/16	1 1/8	6	9/16	18	5
RPC-14	1 3/4	7/16	7/32	6	4 1 1/16	3/4	3/8	2 1/2	1/8	5/16	1/32	3	....	4	7/8	2 3/16	1 1/2	3/8	5/16	1 1/8	6	9/16	18	5
RPC-15	1 7/8	1/2	1/4	7	4 1/2	1 5/16	7/16	3	3/16	1/4	1/32	4	....	5	1	2 1/4	2	7/16	5/16	1 1/4	6	1/2	18	5 1/2
RPC-16	2	1/2	1/4	7	4 1/2	1 5/16	7/16	3	3/16	1/4	1/32	4	....	5	1	2 1/2	2	7/16	5/16	1 1/4	6	5/8	18	5 1/2
RPC-18	2 1/4	5/8	5/16	8	5 5/8	1 1/8	1/2	3 3/8	1/4	5/16	3/64	4 1/4	....	6	1 1/8	2 1 3/16	2 1/2	1/2	1/4	1 1/2	6	3/4	16	6 1/2
RPC-20	2 1/2	5/8	5/16	8	5 5/8	1 1/8	1/2	3 3/8	1/4	5/16	3/64	4 3/4	....	6	1 1/4	3 1/16	2 1/2	1/2	1/4	1 1/2	6	3/4	16	6 1/2
RPC-22	2 3/4	3/4	3/8	9	6 1/16	1 1/8	5/8	4 1/8	1/4	5/16	3/64	5 1/8	....	7	1 1/4	3 1/8	3	5/8	5/16	1 3/4	6	7/8	14	7 1/8
RPC-24	3	3/4	3/8	9	6 1/16	1 1/8	5/8	4 1/8	1/4	5/16	3/64	5 1/8	....	7	1 1/4	3 1/4	3	5/8	5/16	1 3/4	6	7/8	14	7 1/8

Dimensions of Marine Reverse Gear Couplings



Engine coupling—steel

MARINE PROPELLER SHAFT COUPLINGS

ENGINE COUPLING—STEEL

The engine end when integral with the engine shaft is shown in full lines on the drawing. When separate, the shaft taper and dimensions are the same as for Reverse Couplings of the corresponding size.

The reverse gear end, as shown by full lines, shall have drilled bolt holes. When the flange is designed integral with the reverse gear, as shown by dotted lines, the bolt holes shall be drilled and tapped for S. A. E. standard cap screws.

These couplings are designed to be made of steel and are intended for high power engines.

NOTES RELATING TO TABLE BELOW

(T. D.) indicates Tooling Dimensions. Dimensions in inches.

NOTE.—In column "Size No." E indicates Engine, R indicates Reverse Gear, and the figures number of eighths of an inch in shaft diameters.

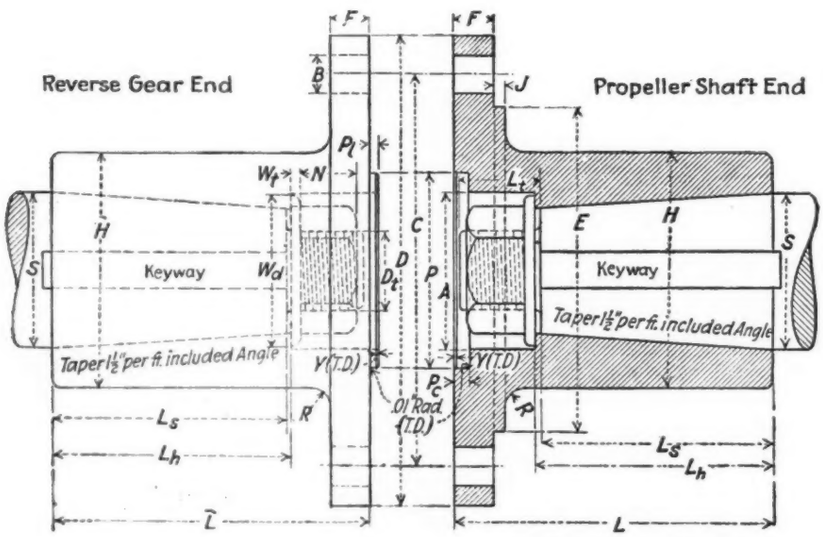
*Pilot tolerance + 0.000, — 0.001 in. per inch of diameter. Pilot recess tolerance, + 0.001, — 0.000 in. per inch of diameter.

†Figures in Column B indicate bolt diameters. Use clearance drill of same nominal size for holes B in flange.

‡All threads to be S. A. E. pitch, U. S. form. See S. A. E. Handbook, Vol. I, sheet 4.

Size No. (See Note)	Equiv. Shaft Diam.	Flange					Pilot				Bolts, S. A. E.			
		D	E	F	J	R	*P	P_1	Pc	Y	No.	†B	‡Thds. per In.	C
ER- 8	1	4	2 13/32	3/8	1/8	3/16	1 3/8	1/16	1/8	1/64	4	3/8	24	3
ER- 9	1 1/8													
ER-10	1 1/4													
ER-11	1 3/8	5	3 11/32	7/16	3/16	3/16	2	1/8	3/16	1/32	6	7/16	20	4
ER-12	1 1/2													
ER-13	1 5/8													
ER-14	1 3/4													
ER-15	1 7/8	6	4 1/16	1/2	1/4	1/4	2 1/2	1/8	3/16	1/32	6	9/16	18	5
ER-16	2													
ER-18	2 1/4	7	4 1/2	5/8	5/16	5/16	3	3/16	1/4	1/32	6	5/8	18	5 1/2
ER-20	2 1/2													
ER-22	2 3/4	8	5 3/8	3/4	3/8	3/8	3 3/4	1/4	5/16	3/64	6	3/4	16	6 1/2
ER-24	3													
ER-26	3 1/4	9	6 1/16	7/8	3/8	7/16	4 3/8	1/4	5/16	3/64	6	7/8	14	7 3/8
ER-28	3 1/2													
ER-32	4	10	6 1/2	1	1/2	1/2	5	5/16	3/8	3/64	6	1	14	8

Dimensions for Marine Engine Couplings



REVERSE COUPLING—STEEL

(See table on page 167)

(T. D.) indicates Tooling Dimension. Dimensions in inches.

NOTE.—In column "Size No." R indicates Reverse Gear, P indicates Propeller Shaft, S indicates Steel, and the figures number of eighths of an inch in shaft diameters.

*Nuts for Size Nos. RPS-26 and RPS-28 use 2¾-in. hex. stock. Nuts for Size No. RPS-32 use 3-in. hex. stock.

†All threads to be S. A. E. pitch, U. S. Form. See S. A. E. Handbook, Vol. I, page 4.

‡Pilot tolerance, + 0.000, — 0.001 in. per inch of diameter. Pilot recess tolerance, + 0.001, — 0.000 in. per inch of diameter.

§Figures in column indicate bolt diameters. Use clearance drill of same nominal size for holes B in flange.

Notes Regarding Materials

When propeller mounts are for use in salt water, bronze or other non-corrosive metal is recommended for all parts of the hub, shaft and fairwater assembly.

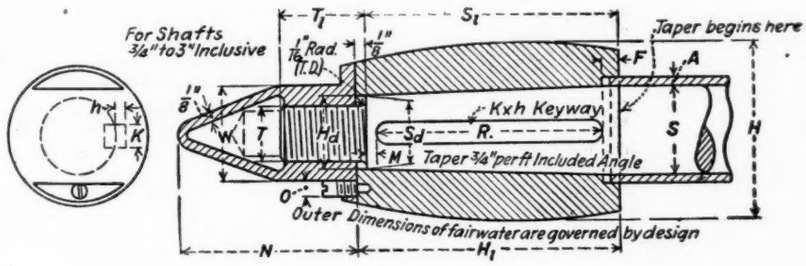
When bronze is used, a tensile strength of 60,000 lb. per sq. in. and an elongation of 28 per cent in 2 inches is recommended. The chemical composition of a bronze conformnig to these physical properties is as follows: Copper, 62 per cent; tin, 1 per cent; spelter, 37 per cent.

A bronze having similar physical characteristics is commonly known as "Tobin bronze."

Dimensions for Marine Reverse Gear Couplings of Steel

Size No. (See Note)	Shaft and *Nut						Key-way		Washer		Flange					Pilot				Hub				Bolts, S. A. E.		
	S	Ls	Dt	N	†Thds. S.A.E.	Lt	Width	Height	Wd	Wt	D	E	F	J	A	‡P	P1	P2	Y	H	L	Lh	R	No.	§B	C
RPS- 8	1	1 3/16	9/16	7/16	18	5/8	1/4	1/8	1 3/16	1/8	4	2 13/32	5/8	1/16	1 3/8	1 5/8	1/16	1/8	1/64	1 1/8	2 1/2	1 3/8	3/16	4	3/8	3
RPS- 9	1 1/8	1 3/16	9/16	7/16	18	5/8	1/4	1/8	1 3/16	1/8	4	2 13/32	5/8	1/16	1 3/8	1 5/8	1/16	1/8	1/64	1 1/8	2 1/2	1 3/8	3/16	4	3/8	3
RPS-10	1 1/4	2 3/16	3/4	9/16	16	3/4	5/16	5/32	1 7/16	1/8	5	3 11/32	7/16	3/32	1 3/4	2	1/8	3/16	1/32	2 3/8	3	2 1/4	3/32	6	7/16	4
RPS-11	1 3/8	2 3/16	3/4	9/16	16	3/4	3/8	7/16	1 7/16	1/8	5	3 11/32	7/16	3/32	1 3/4	2	1/8	3/16	1/32	2 3/8	3	2 1/4	3/32	6	7/16	4
RPS-12	1 1/2	2 3/16	3/4	9/16	16	3/4	3/8	9/16	1 7/16	1/8	5	3 11/32	7/16	3/32	1 3/4	2	1/8	3/16	1/32	2 3/8	3	2 1/4	3/32	6	7/16	4
RPS-13	1 5/8	2 3/16	3/4	9/16	16	3/4	3/8	9/16	1 7/16	1/8	5	3 11/32	7/16	3/32	1 3/4	2	1/8	3/16	1/32	2 3/8	3	2 1/4	3/32	6	7/16	4
RPS-14	1 3/4	2 1 5/16	1	3/4	14	1	7/16	5/32	1 13/16	1/8	6	4 1/16	1/2	1/8	2 5/16	2 1/2	1/8	3/16	1/32	3	4	3	1/4	6	9/16	5
RPS-15	1 7/8	2 1 5/16	1	3/4	14	1	1/2	1/4	1 13/16	1/8	6	4 1/16	1/2	1/8	2 5/16	2 1/2	1/8	3/16	1/32	3	4	3	1/4	6	9/16	5
RPS-16	2	2 1 5/16	1	3/4	14	1	1/2	1/4	1 13/16	3/16	6	4 1/16	1/2	1/8	2 5/16	2 1/2	1/8	3/16	1/32	3	4	3	1/4	6	9/16	5
RPS-18	2 1/4	3 1 5/16	1 1/8	1 1/16	12	1 1/8	5/8	5/16	2 5/16	3/16	7	4 1/2	5/8	1/8	2 1/2	3	5/16	1/4	1/32	3 3/4	5	3 3/8	9/16	6	5/8	5 1/2
RPS-20	2 1/2	3 1 5/16	1 1/8	1 1/16	12	1 1/8	5/8	5/16	2 5/16	3/16	7	4 1/2	5/8	1/8	2 1/2	3	5/16	1/4	1/32	3 3/4	5	3 3/8	9/16	6	5/8	5 1/2
RPS-22	2 3/4	4 1/2	1 3/8	7/8	12	1 1/4	3/4	7/8	2 1/16	1/4	8	5 3/8	3/4	1/8	3	3 3/4	1/4	5/16	3/64	4 3/8	5 1/2	4 1/4	3/4	6	3/4	6 1/2
RPS-24	3	4 1/2	1 3/8	7/8	12	1 1/4	3/4	7/8	2 1/16	1/4	8	5 3/8	3/4	1/8	3	3 3/4	1/4	5/16	3/64	4 3/8	6	4 1/4	3/4	6	3/4	6 1/2
RPS-26	3 1/4	5 3/16	1 1/2	7/8	12	1 3/8	3/8	7/16	3 3/16	1/4	9	6 1/16	7/8	3/16	3 3/4	4 3/8	1/4	5/16	3/64	5	7	5 1/8	7/16	6	7/8	7 3/8
RPS-28	3 1/2	5 3/16	1 3/4	7/8	12	1 3/8	3/8	7/16	3 3/16	1/4	9	6 1/16	7/8	3/16	3 3/4	4 3/8	1/4	5/16	3/64	5	7	5 1/8	7/16	6	7/8	7 3/8
RPS-32	4	6 1/4	2	1 5/16	12	1 1/2	1	1/2	3 1/16	5/16	10	6 1/2	1	3/16	4 1/4	5	5/16	3/8	3/64	6	8	6 1/2	1/2	6	1	8

Shaft and Hub Taper Fits


For Shafts 3/4" to 3" Inclusive
Taper begins here
1" Rad (T.D.)
Kxh Keyway
Taper 3/4" per ft Included Angle
Outer Dimensions of fairwater are governed by design

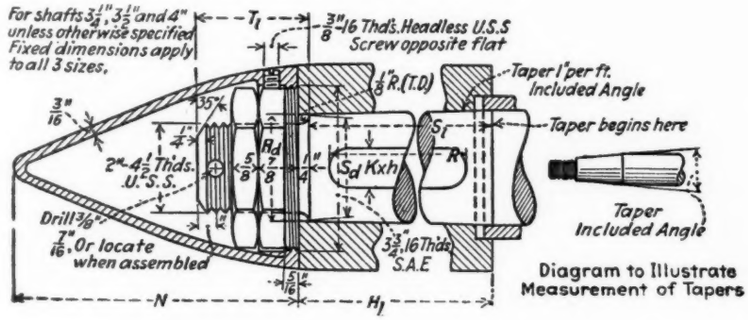
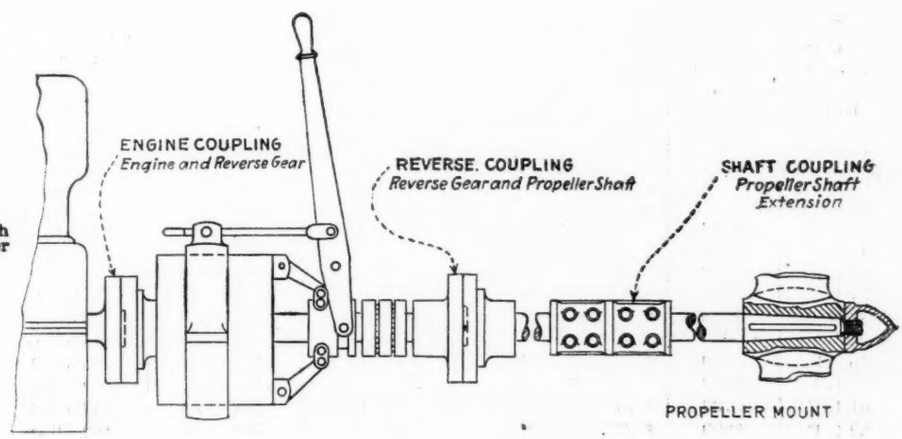

For shafts 3 1/4", 3 1/2" and 4" unless otherwise specified Fixed dimensions apply to all 3 sizes.
3/4"-16 Thds. Headless U.S.S Screw opposite flat
1/8" R. (T.D.)
Taper 1" per ft. Included Angle
Taper begins here
2"-4 1/2 Thds. U.S.S.
Drill 3/8" 7/16" Or locate when assembled
3 1/4"-16 Thds. S.A.E.
Taper Included Angle

Diagram to Illustrate Measurement of Tapers

The small end of the **shaft** and hub tapers (Sd and Hd in the drawings **and** table) are the governing dimensions **which** insure proper assembly of varying hub **lengths** on the shaft, and clearance between the end of the shaft taper **and** the bottom of the **shaft nut.**

MOTORBOAT TRANSMISSION ASSEMBLY

Drawing indicates the order in which the recommended couplings and propeller mount are assembled.



NOTES ON AERONAUTIC TURNBUCKLE DIMENSIONS

FACTORS CONTROLLING INTERCHANGEABILITY

The Recommended Practice for Turnbuckle Dimensions is not intended to limit design, but rather to aid manufacturers in designing, and so eliminate all differences that would otherwise interfere with interchangeability. The dimensions of the slot and the pin diameter in the fork end, and size of hole in the eye end, are the most important factors influencing interchangeability.

THREAD FITS, PROTECTIVE COATING AND INSPECTION METHOD

The fit of the threads in the barrel, the protective coating and method of inspection are to be specified by the purchaser. As a matter of information, the present practice for threads requires that they must have a snug, true fit, allowing barrel or shank to be turned by hand, and showing no perceptible slackness in fit or end-shake with three threads exposed.

TURNBUCKLE STRENGTHS

The turnbuckle strengths in the tables are for 19-strand steel wire cable (see S. A. E. Handbook, Vol. I, pages 45pc and 45pd). Breaking strength of spliced cable is about 10 per cent less than undisturbed cable. Yielding point of solid wire loops is about 20 per cent less than specified wire strength.

MEASUREMENT OF TAKE-UPS

Take-ups are measured with the threads of the turnbuckle ends flush with the ends of the barrel.

The amount of take up for each turnbuckle end is measured from the end of the barrel to a point on the radius f/2, on the detail drawings, which would strike the barrel threads. In some cases the take-up is limited to the distance from the inner end of the Eye, Fork or Clevis End to the near side of the spanner hole.

The total take-up is equal to twice that of the end having the least take-up.

Aeronautic Turnbuckle Dimensions

GENERAL ASSEMBLY

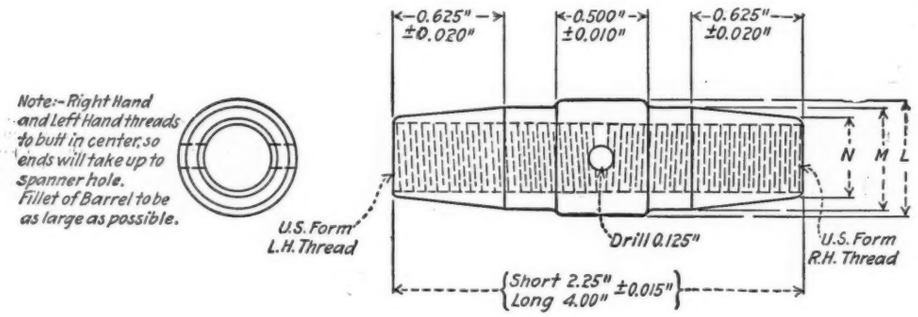
S. A. E. Symbols (See Key)	Strength, Lb.	Cable Diameter	Approx. Take-up See Note 1	A See Note 2	c See Note 3	D	E Threads, U. S. Form	f	G See Note 4	H	J	V Thimble Radius
Tolerances	.....	.....	.....	+.010 −.000	+.006 −.000	+.010 −.000	+.0000 −.0040	+.010 −.005	+.010 −.000	+.010 −.005	+.005 −.005	.....
16 S F	1600	109 (7/64)	1.04	.219 (7/32)	.133	188 (3/16)	.1900 (No. 10)-32	313 (5/16)	.150	.469 (15/32)	.188 (3/16)	.175
16 L F	1600	109 (7/64)	2.79	.219 (7/32)	.133	188 (3/16)	.1900 (No. 10)-32	313 (5/16)	.150	.469 (15/32)	.188 (3/16)	.175
21 S F	2100	125 (1/8)	1.00	.219 (7/32)	.155	188 (3/16)	.2160 (No. 12)-28	313 (5/16)	.150	.500 (1/2)	.188 (3/16)	.175
21 L F	2100	125 (1/8)	2.75	.219 (7/32)	.155	188 (3/16)	.2160 (No. 12)-28	313 (5/16)	.150	.500 (1/2)	.188 (3/16)	.175
32 S F	3200	156 (5/32)	0.61	.281 (9/32)	.189	250 (1/4)	*.2500 (1/4)-28	438 (7/16)	†.203 (13/64)	.625 (5/8)	.219 (7/32)	.200
32 L F	3200	156 (5/32)	2.36	.281 (9/32)	.189	250 (1/4)	*.2500 (1/4)-28	438 (7/16)	†.203 (13/64)	.625 (5/8)	.219 (7/32)	.200
46 S F	4600	188 (3/16)	0.64	.313 (5/16)	.243	250 (1/4)	*.3125 (5/16)-24	438 (7/16)	†.203 (13/64)	.625 (5/8)	.281 (9/32)	.250
46 L F	4600	188 (3/16)	2.39	.313 (5/16)	.243	250 (1/4)	*.3125 (5/16)-24	438 (7/16)	†.203 (13/64)	.625 (5/8)	.281 (9/32)	.250
61 L F	6100	219 (7/32)	2.08	.344 (11/32)	.256	375 (3/8)	*.3750 (3/8)-24	563 (9/16)	†.203 (13/64)	.720 (23/32)	.281 (9/32)	.300
80 L F	8000	250 (1/4)	2.00	.375 (3/8)	.306	375 (3/8)	*.3750 (3/8)-24	563 (9/16)	†.266 (17/64)	.781 (25/32)	.328 (21/64)	.350

KEY TO SYMBOLS.—The numbers indicate the turnbuckle strength in hundred pounds. The following letter, "Short" or "Long." The last letter indicates whether Fork (*F*) or Clevis (*C*) End is used in combination with Eye End. When the turnbuckle make-up calls for ends to be alike, one end shall have right hand, and the other end left hand, thread.

*Tolerance is + 0.0000 in., — 0.0060 in. †Tolerance is + 0.015 in., — 0.0000 in. Dimensions in inches.

NOTES.—1. Total take-ups for Eye End and Fork End assembly.
2. Will take 0.0180 in. serving. Use same size thimble as cable size.
3. Allows approximately 0.0150 in. on diameter below root diameter of thread.
4. Four clip thicknesses, 1/10, 1/8, 3/16, 1/4 in.

For further Notes on Aeronautic Turnbuckle Dimensions, see S. A. E. Handbook, Vol. I, page 45uj.


Note:-Right Hand and Left Hand threads to butt in center, so ends will take up to spanner hole. Fillet of Barrel to be as large as possible.
0.625" ±0.020"
0.500" ±0.010"
0.625" ±0.020"
N
M
L
U.S. Form L.H. Thread
Drill 0.125"
U.S. Form R.H. Thread
Short 2.25" ±0.015"
Long 4.00"

TURNBUCKLE BARREL

S. A. E. Symbols (See Key)	Strength, Lb.	Naval Brass Bureau of Aircraft Production Specification No. 11030, or Equivalent, Ultimate Strength 67,000 Lb. per Sq. In.			
		E Threads, U. S. Form	L	M	N
Tolerances	.....	+.0000 −.0040	+.005 −.005	+.005 −.005	+.005 −.005
16 S F	1600	.1900 (No. 10)-32	.375 (3/8)	.281 (9/32)	.250 (1/4)
16 L F	1600	.1900 (No. 10)-32	.375 (3/8)	.281 (9/32)	.250 (1/4)
21 S F	2100	.2160 (No. 12)-28	.375 (3/8)	.328 (21/64)	.281 (9/32)
21 L F	2100	.2160 (No. 12)-28	.375 (3/8)	.328 (21/64)	.281 (9/32)
32 S F	3200	*.2500 (1/4)-28	.438 (7/16)	.391 (25/64)	.328 (21/64)
32 L F	3200	*.2500 (1/4)-28	.438 (7/16)	.391 (25/64)	.328 (21/64)
46 S F	4600	*.3125 (5/16)-24	.500 (1/2)	.438 (7/16)	.406 (13/32)
46 L F	4600	*.3125 (5/16)-24	.500 (1/2)	.438 (7/16)	.406 (13/32)
61 L F	6100	*.3750 (3/8)-24	.625 (5/8)	.594 (19/32)	.469 (15/32)
80 L F	8000	*.3750 (3/8)-24	.625 (5/8)	.594 (19/32)	.469 (15/32)

BARREL

KEY TO SYMBOLS. — The numbers indicate the turnbuckle strength in hundred pounds. The following letter "Short" or "Long." The last letter indicates whether Fork (*F*) or Clevis (*C*) End is used in combination with Eye End. When the turnbuckle make-up calls for both ends to be alike, one end shall have right hand, and the other left hand, thread.

*Tolerance is + 0.0000 in., — 0.0060 in. Dimensions in inches.

TURNBUCKLE EYE END

S. A. E. Symbols (See Key)	Strength, Lb.	Approx. Take-up	A See Note 1	B See Note 2	c See Note 3	E Threads, U. S. Form	f	I	J	R See Note 4	S	V Thimble Radius	Y See Note 5	Z
Tolerances	....	.....	+.010 −.000	+.005 −.005	+.006 −.000	+.0000 −.0040	+.010 −.005	...	+.005 −.005	.....	+.007 −.007	.....	+.010 −.000	+.030 −.010
16 S F	1600	0.80	.219 (7/32)	.28	.133	.1900 (No. 10)-32	.313 (5/16)	.03	.188 (3/16)	.326	.500 (1/2)	.175	.505	1.125 (1 1/8)
16 L F	1600	1.67	.219 (7/32)	.28	.133	.1900 (No. 10)-32	.313 (5/16)	.03	.188 (3/16)	.326	.500 (1/2)	.175	.505	2.000
21 S F	2100	0.59	.219 (7/32)	.28	.155	.2160 (No. 12)-28	.313 (5/16)	.03	.188 (3/16)	.328	.500 (1/2)	.175	.557	1.125 (1 1/8)
21 L F	2100	1.47	.219 (7/32)	.28	.155	.2160 (No. 12)-28	.313 (5/16)	.03	.188 (3/16)	.328	.500 (1/2)	.175	.557	2.000
32 S F	3200	0.69	.281 (9/32)	.353	.189	*.2500 (1/4)-28	.438 (7/16)	.04	.219 (7/32)	.402	.625 (5/8)	.200	.625 (5/8)	1.125 (1 1/8)
32 L F	3200	1.56	.281 (9/32)	.353	.189	*.2500 (1/4)-28	.438 (7/16)	.04	.219 (7/32)	.402	.625 (5/8)	.200	.625 (5/8)	2.000
46 S F	4600	0.68	.313 (5/16)	.384	.243	*.3125 (5/16)-24	.438 (7/16)	.04	.281 (9/32)	.465	.688 (11/16)	.250	.750 (3/4)	1.125 (1 1/8)
46 L F	4600	1.56	.313 (5/16)	.384	.243	*.3125 (5/16)-24	.438 (7/16)	.04	.281 (9/32)	.465	.688 (11/16)	.250	.750 (3/4)	2.000
61 L F	6100	1.55	.344 (11/32)	.435	.256	*.3750 (3/8)-24	.563 (9/16)	.06	.281 (9/32)	.503	.750 (3/4)	.300	.875 (7/8)	2.000
80 L F	8000	1.37	.375 (3/8)	.498	.306	*.3750 (3/8)-24	.563 (9/16)	.06	.328 (21/64)	.619	.875 (7/8)	.350	.875 (7/8)	2.000

KEY TO SYMBOLS.—The numbers indicate the turnbuckle strength in hundred pounds. The following letter, "Short" or "Long." The last letter indicates whether Fork (*F*) or Clevis (*C*) End is used in combination with Eye End. When the turnbuckle make-up calls for ends to be alike, one end shall have right hand, and the other left hand, thread.

*Tolerance is +0.0000 in., −0.0060 in. Ultimate strength, 125,000 lb. per sq. in. Dimensions in inches.

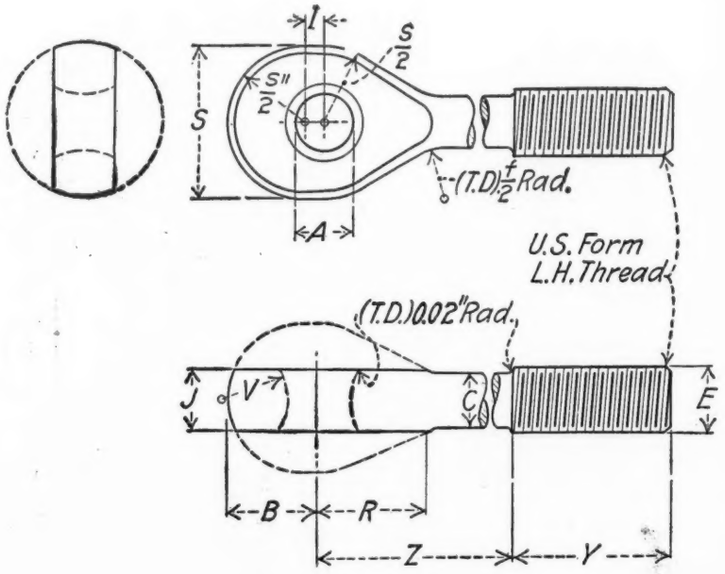
NOTES.—1. Will take 0.018 in. serving. Use same size thimble as cable size.

2. Equals $\frac{S}{2}+I$.

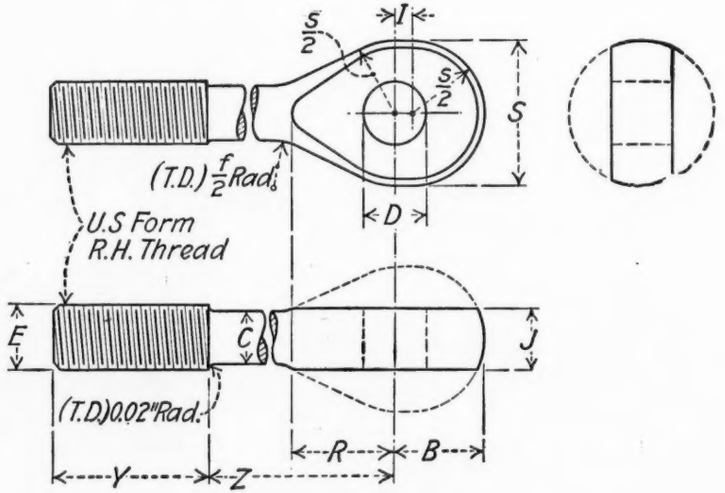
3. Allows approximately 0 0150 in. on diameter below root diameter of thread.

4. Equals $\frac{S+c}{2}$, approximately.

5. Equals 2 E+0.125 in



Eye end of turnbuckle



Clevis end of turnbuckle

TURNBUCKLE CLEVIS END

S. A. E. Symbols (See Key)	Strength, Lb.	Approx. Take-up,	B See Note 1	c See Note 2	D	E Threads, U. S. Form		I	J	R See Note 3	S	Y See Note 4	Z
Tolerances	.....	.....	+.005 −.005	+.006 −.000	+.010 −.000	+.0000 −.0040	+.010 −.005	..	+.005 − C05	.....	+.007 −.007	+.040 −.000	+.030 −.010
16 S F	1600	0 80	.28	.133	.188 (3/16)	.1900 (No. 10)-32	.313 (5/16)	03	188 (3/16)	.326	500 (1/2)	.505	1.125 (1 1/8)
16 L F	1600	1.67	.28	.133	.188 (3/16)	.1900 (No. 10)-32	.313 (5/16)	03	188 (3/16)	326	500 (1/2)	.505	2.000
21 S F	2100	0 59	28	.155	.188 (3/16)	2160 (No. 12)-28	313 (5/16)	03	188 (3/16)	.328	500 (1/2)	.557	1 125 (1 1/8)
21 L F	2100	1.47	.28	.155	.188 (3/16)	2160 (No. 12)-28	313 (5/16)	03	.188 (3/16)	.328	.500 (1/2)	.557	2.000
32 S F	3200	0.69	.353	.189	.250 (1/4)	*.2500 (1/4)-28	438 (7/16)	04	219 (7/32)	.402	.625 (5/8)	.625 (5/8)	1.125 (1 1/8)
32 L F	3200	1.56	.353	.189	.250 (1/4)	*.2500 (1/4)-28	438 (7/16)	.04	.219 (7/32)	402	625 (5/8)	625 (5/8)	2.000
46 S F	4600	0.68	.384	.243	250 (1/4)	*.3125 (5/16)-24	438 (7/16)	.04	281 (9/32)	.465	688 (11/16)	.750 (3/4)	1.125 (1 1/8)
46 L F	4600	1.56	.384	.243	.250 (1/4)	*.3125 (5/16)-24	438 (7/16)	.04	281 (9/32)	.465	.688 (11/16)	.750 (3/4)	2.000
61 L F	6100	1.55	.435	.256	.375 (3/8)	*.3750 (3/8)-24	.563 (9/16)	06	281 (9/32)	.503	.750 (3/4)	.875 (7/8)	2.000
80 L F	8000	1.37	498	306	375 (3/8)	*.3750 (3/8)-24	563 (9/16)	06	328 (21/64)	619	875 (7/8)	875 (7/8)	2.000

KEY TO SYMBOLS.—The number indicate the turnbuckle strength in hundred pounds. The following letter, "Short" or "Long." The last letter indicates whether Fork (*F*) or Clevis (*C*) End is used in combination with Eye End When the turnbuckle make-up calls for ends to be alike, one end shall have right hand, and the other end left hand thread.

*Tolerance is +0.0000 in. −0.0060 in. Dimensions in inches.

NOTES.—1. Equals $\frac{S}{2}+I$.

2. Allows approximately 0.015 in. on diameter below root diameter of thread.

3. Equals $\frac{S+c}{2}$, approximately.

4. Equals 2 E+0.125 in.

Dimensions of Aircraft Turnbuckles

TURNBUCKLE FORK END

S. A. E. Symbols (See Key)	Strength, Lb.	Approx. Take-up	e See Note 1	D	E Threads, U. S. Form		G See Note 2	H	I	Q	S	§W Min.	Y See Note 3	Z
Tolerances	....	....	+.000 −.000	+.010 −.000	+.0000 −.0040	+.010 −.005	+.010 −.000	+.010 −.005	...	.....	+.007 −.007	....	+.040 −.000	+.030 −.010
16 S F	1600	0.520	.133	188 (3/16)	.1900 (No. 10)–32	313 (5/16)	.150	.469 (15/32)	.03	.250 (1/4)	.500 (1/2)	.074	.505	1 125 (1 1/8)
16 L F	1600	1.395	.133	188 (3/16)	.1900 (No. 10)–32	313 (5/16)	.150	.469 (15/32)	.03	.250 (1/4)	.500 (1/2)	.074	.505	2.000
21 S F	2100	0.500	.155	.188 (3/16)	.2160 (No. 12)–28	.313 (5/16)	.150	.500 (1/2)	.03	.250 (1/4)	.500 (1/2)	.074	.557	1.125 (1 1/8)
21 L F	2100	1.375	.155	.188 (3/16)	.2160 (No. 12)–28	.313 (5/16)	.150	.500 (1/2)	.03	.250 (1/4)	.500 (1/2)	.074	.557	2.000
32 S F	3200	0.306	.189	.250 (1/4)	*.2500 (1/4)–28	.438 (7/16)	†.203 (13/64)	.625 (5/8)	.04	.297 (19/64)	.625 (5/8)	.108	.625 (5/8)	1 125 (1 1/8)
32 L F	3200	1.181	.189	.250 (1/4)	*.2500 (1/4)–28	.438 (7/16)	†.203 (13/64)	.625 (5/8)	.04	.297 (19/64)	.625 (5/8)	.108	.625 (5/8)	2.000
46 S F	4600	0.320	.243	.250 (1/4)	*.3125 (5/16)–24	.438 (7/16)	†.203 (13/64)	.625 (5/8)	.04	.344 (11/32)	.688 (11/16)	.108	.750 (3/4)	1 125 (1 1/8)
46 L F	4600	1 195	.243	.250 (1/4)	*.3125 (5/16)–24	.438 (7/16)	†.203 (13/64)	.625 (5/8)	.04	.344 (11/32)	.688(1)	.108	.750 (3/4)	2.000
61 L F	6100	1.040	.256	.375 (3/8)	*.3750 (3/8)–24	.563 (9/16)	†.203 (13/64)	.750 (3/4)	.06	.375 (3/8)	.750 (3/4)	.170	.875 (7/8)	2.000
80 L F	8000	1.000	.306	.375 (3/8)	*.3750 (3/8)–24	.563 (9/16)	†.266 (17/64)	.781 (25/32)	.06	.453 (29/64)	.875 (7/8)	.139	.87 7/8)	2.000

KEY TO SYMBOLS IN THE TABLE ABOVE.—The numbers indicate the turnbuckle strength in hundred pounds. The following letter, "Short" or "Long." The last letter indicates whether Fork (*F*) or Clevis (*C*) End is used in combination with Eye End. When the turnbuckle make-up calls for ends to be alike, one end shall have right hand, and the other left hand, thread.

Dimensions in inches.

Ultimate strength, 125,000 lb. per sq. in.

*Tolerance is +0.0000 in.,—0.0060 in.

†Tolerance +0.0150 in.,—0.0000 in.

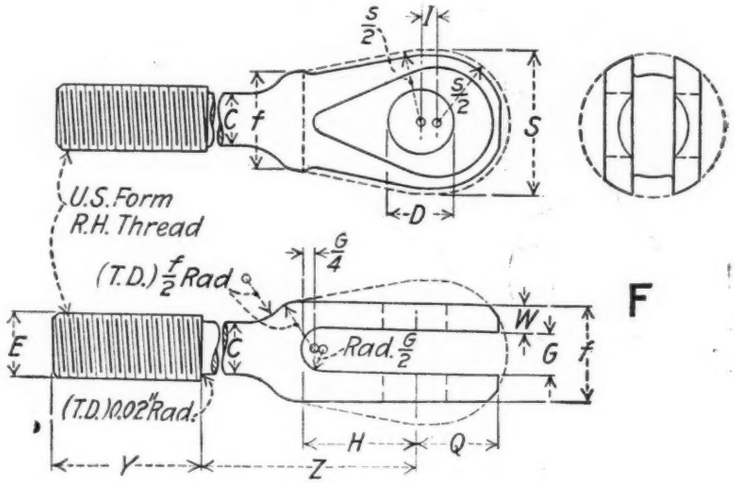
§To prevent off-centering of slot it is recommended that time thickness be governed by formula $W\ (min.) = \frac{F\ (min.) - G\ (max.)}{2}$

NOTES.—1. Allows approximately 0.0150 in. on diameter below root diameter of thread.
2. Four clip thicknesses, 1/16, 1/8, 3/16, 1/4.
3. Equals 2 E + 0.125 in.

All threads U. S. Form in the two tables below. Dimensions in inches. T. D. = Tooling Dimension.

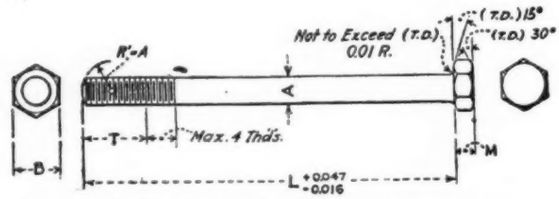
*Finished size including plating or rust preventing treatment when used. Bureau of Standards recommends .00 in. as thickness of plating for rust prevention.

†It is recommended that production of the (No. 12) 28 bolts and nuts become effective at once, and not later than **Jan. 1 1919.**



Fork end of turnbuckle

Bolts, Size A, Threads per Inch	*Limits A	B	M	R
.1640 (No. 8)–32	0.1640 0.1610	.313 (5/16)	.172 (11/64)	.375 (3/8)
.1900 (No. 10)–32	0.1900 0.1870	.375 (3/8)	.172 (11/64)	.375 (3/8)
†.2160 (No. 12)–28	0.2160 0.2120	.375 (3/8)	.172 (11/64)	.375 (3/8)
.2500 (1/4")–28	0.2500 0.2460	.438 (7/16)	.203 (13/64)	.375 (3/8)
.3125 (5/16")–24	0.3125 0.3085	.500 (1/2)	.250 (1/4)	.375 (3/8)
.3750 (3/8")–24	0.3750 0.3710	.563 (9/16)	.313 (5/16)	.500 (1/2)
.4375 (7/16")–20	0.4375 0.4335	.688 (11/16)	.359 (23/64)	.500 (1/2)
.5000 (1/2")–20	0.5000 0.4960	.750 (3/4)	.375 (3/8)	.500 (1/2)
.5625 (9/16")–18	0.5625 0.5575	.875 (7/8)	.469 (15/32)	.625 (5/8)
.6250 (5/8")–18	0.6250 0.6200	.938 (15/16)	.516 (33/64)	.625 (5/8)
When body length L =		1/2"	5/8"	3/4"	7/8"	1"	Over 1"
Length of thread T =		3/8"	7/16"	1/2"	1/2"	1/2"	3/4"

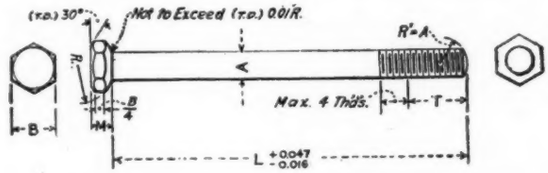


PLAIN HEXAGON HEAD BOLTS—AERONAUTIC
(For Bodies and Wings, not Engines)

T = Min. Length of Usable Thread.

M (for 1/4 in. dia. and larger) $= \frac{A}{2} + \frac{1"}{32}$

Bolts, Size A, Threads per Inch	*Limits A	B	M ±.005
.1120 (No. 4)–48	0.1120 0.1090	.250 (1/4)	.094 (3/32)
.1380 (No. 6)–40	0.1380 0.1350	.313 (5/16)	.094 (3/32)
.1640 (No. 8)–32	0.1640 0.1610	.313 (5/16)	.125 (1/8)
.1900 (No. 10)–32	0.1900 0.1870	.375 (3/8)	.125 (1/8)
†.2160 (No. 12)–28	0.2160 0.2120	.375 (3/8)	.125 (1/8)
.2500 (1/4")–28	0.2500 0.2460	.438 (7/16)	.156 (5/32)
.3125 (5/16")–24	0.3125 0.3085	.500 (1/2)	.188 (3/16)
.3750 (3/8")–24	0.3750 0.3710	.563 (9/16)	.219 (7/32)
.4375 (7/16")–20	0.4375 0.4335	.688 (11/16)	.250 (1/4)
.5000 (1/2")–20	0.5000 0.4960	.750 (3/4)	.281 (9/32)
.5625 (9/16")–18	0.5625 0.5575	.875 (7/8)	.313 (5/16)
.6250 (5/8")–18	0.6250 0.6200	.938 (15/16)	.344 (11/32)
When body length L =		1/2"	5/8"	3/4"	7/8"	1"	Over 1"
Length of thread T =		3/8"	7/16"	1/2"	1/2"	1/2"	3/4"



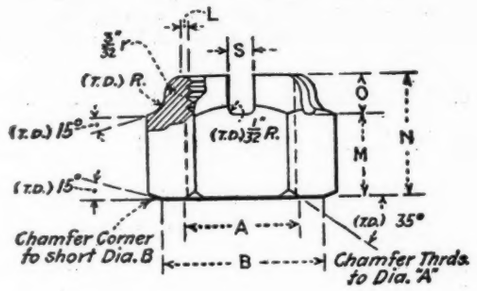
BALL HEXAGON-HEAD BOLTS—AERONAUTIC
(For Bodies and Wings, not Engines)

$\frac{B}{4}$ is min., and is specified to safeguard the width of wrench surface.

T = Min. Length of Usable Thread.

CASTLE HEXAGON NUTS—AERONAUTIC

(For Bodies and Wings, not Engines)

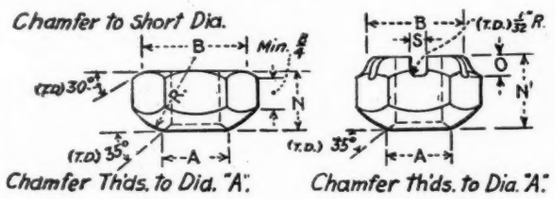


Size A and Threads per Inch	B	N	S	O	M	*L	R
.1640 (No. 8)-32	375 (⅜)	.234 (15/64)	.078 (5/64)	.078 (5/64)	156 (5/32)	.016 (1/64)	.094 (3/32)
.1900 (No. 10)-32	375 (⅜)	.250 (¼)	.078 (5/64)	.078 (5/64)	.172 (11/64)	.016 (1/64)	.094 (3/32)
†.2160 (No. 12)-28	.438 (7/16)	.266 (17/64)	.078 (5/64)	.094 (3/32)	.172 (11/64)	.031 (1/32)	.094 (3/32)
.2500 (¼")-28	.438 (7/16)	.281 (9/32)	.078 (5/64)	.094 (3/32)	.188 (3/16)	.031 (1/32)	.094 (3/32)
.3125 (5/16")-24	500 (½)	.328 (21/64)	.078 (5/64)	.094 (3/32)	.234 (15/64)	.031 (1/32)	.094 (3/32)
.3750 (⅜")-24	.563 (9/16)	.406 (13/32)	.125 (⅛)	.125 (⅛)	.281 (9/32)	.031 (1/32)	.094 (3/32)
.4375 (7/16")-20	.688 (11/16)	.453 (29/32)	.125 (⅛)	.125 (⅛)	328 (21/64)	.047 (3/64)	.125 (⅛)
.5000 (½")-20	.750 (¾)	.563 (9/16)	.125 (⅛)	.188 (3/16)	.375 (⅜)	.047 (3/64)	.125 (⅛)
.5625 (9/16")-18	.875 (⅞)	.609 (39/64)	.156 (5/32)	.188 (3/16)	.422 (27/64)	.047 (3/64)	.156 (5/32)
.6250 (⅝")-18	.938 (15/16)	.719 (23/32)	.156 (5/32)	.250 (¼)	.469 (15/32)	.047 (3/64)	.156 (5/32)

A = Size of Bolt.
All Threads U. S. Form.
T. D. = Tooling Dimensions.
B = Also Size of Hexagon.
O = Also Depth of Slot.
Dimensions in Inches.
*L = Distance from A to beginning of 3/32 in. radius whose center is floating to satisfy curve.
†It is recommended that production of the (No. 12)-28 nuts and bolts become effective at once, and not later than Jan. 1, 1919.

BALL HEXAGON NUTS—AERONAUTIC

(For Bodies and Wings, not Engines)



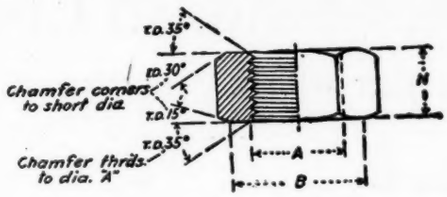
$\frac{B}{4}$ is specified to safeguard the width of wrench surface.

Size A and Threads per Inch	B	Ball Hexagon		Ball Castle		
		N	R	N¹	S	O
.1640 (No. 8)-32	.375 (⅜)	.172 (11/64)	.375 (⅜)	.250 (¼)	.078 (5/64)	.078 (5/64)
.1900 (No. 10)-32	.375 (⅜)	.172 (11/64)	.375 (⅜)	.250 (¼)	.078 (5/64)	.078 (5/64)
.2160 (No. 12)-28	.438 (7/16)	.172 (11/64)	.375 (⅜)	.266 (17/64)	.078 (5/64)	.094 (3/32)
.2500 (¼")-28	.438 (7/16)	.203 (13/64)	.375 (⅜)	.297 (19/64)	.078 (5/64)	.094 (3/32)
.3125 (5/16")-24	.500 (½)	.250 (¼)	.375 (⅜)	.344 (11/32)	.078 (5/64)	.094 (3/32)
.3750 (⅜")-24	.563 (9/16)	.313 (5/16)	.500 (½)	.438 (7/16)	.125 (⅛)	.125 (⅛)
.4375 (7/16")-20	.688 (11/16)	.359 (23/64)	.500 (½)	.484 (31/64)	.125 (⅛)	.125 (⅛)
.5000 (½")-20	.750 (¾)	.375 (⅜)	.500 (½)	.563 (9/16)	.125 (⅛)	.188 (3/16)
.5625 (9/16")-18	.875 (⅞)	.469 (15/32)	.625 (⅝)	.656 (21/32)	.156 (5/32)	.188 (3/16)
.6250 (⅝")-18	.938 (15/16)	.516 (33/64)	.625 (⅝)	.766 (49/64)	.156 (5/32)	.250 (¼)

All Threads U. S. Form.
Dimensions in Inches.
T. D. = Tooling Dimensions.
N¹ = N + O. A = Size of Bolt.
B = Also Size of Hexagon.
*It is recommended that production of the (No. 12)-28 nuts and bolts become effective at once, and not later than Jan. 1, 1919.

PLAIN HEXAGON NUTS—AERONAUTIC

(For Bodies and Wings, not Engines)



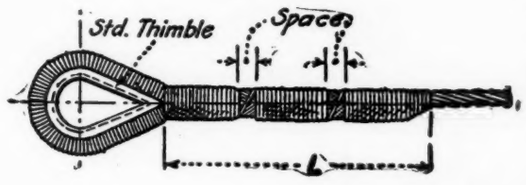
A Size	Threads per In.	B Hex. Short Dia.	*N Full Strength ±.005	*N Thin and Check ±.005
.1120 (No. 4)	48	.250 (¼)	.094 (3/32)	.094 (3/32)
.1380 (No. 6)	40	.313 (5/16)	.109 (7/64)	.109 (7/64)
.1640 (No. 8)	32	.375 (⅜)	.125 (⅛)	.125 (⅛)
.1900 (No. 10)	32	.375 (⅜)	.141 (9/64)	‡.141 (9/64)
†.2160 (No. 12)	28	.438 (7/16)	.156 (5/32)	‡.156 (5/32)
.2500 (¼)	28	.438 (7/16)	.188 (3/16)	.125 (⅛)
.3125 (5/16)	24	.500 (½)	.234 (15/64)	.156 (5/32)
.3750 (⅜)	24	.563 (9/16)	.281 (9/32)	.188 (3/16)
.4375 (7/16)	20	.688 (11/16)	.328 (21/64)	.219 (7/32)
.5000 (½)	20	.750 (¾)	.375 (⅜)	.250 (¼)
.5625 (9/16)	18	.875 (⅞)	.422 (27/64)	.281 (9/32)
.6250 (⅝)	18	.938 (15/16)	.469 (15/32)	.313 (5/16)

A = size of bolt.
T.D. = Tooling dimensions.
Dimensions in inches.
All threads U. S. form.

*For full strength nuts, $N = \frac{3A}{4}$ For check nuts, and thin nuts for shear bolts ¼ in. diameter and larger, $N = \frac{A}{2}$

†It is recommended that production of the (No. 12)-28 bolts and nuts become effective at once, and not later than Jan. 1, 1919.
‡Subject to revision.

LOOPS FOR NON-FLEXIBLE SINGLE-STRAND STEEL CABLE —AERONAUTIC



The loop portion is served with 0.0180 in. soft steel tinned wire before thimble is inserted. The splice portion is served with 0.4010 in. soft steel tinned wire, divided into three equal sections as indicated in cut. The entire serving, including thimble and splice, must be soldered without drawing temper of wire.

Diameter of Cable, Inches	Number of Strands	No. of Wires per Strand	Splice L	Space	Length of Loop Serving	Breaking Strength of Cable, Lb.
1/16	1	19	1½	⅛	1	500
3/32	1	19	2	⅛	1¼	1100
⅛	1	19	2½	⅛	1½	2100
5/32	1	19	2¾	⅛	2	3200
3/16	1	19	3	3/16	2¼	4600
7/32	1	19	3½	3/16	2¼	6100
¼	1	19	4	¼	2½	8000

LOOPS AND FERRULES FOR ROUND TINNED STEEL WIRE—AERONAUTIC

These recommended loops for round wires are made by threading the tension wire through a ferrule, forming a loop of the specified size, slipping ferrule up against loop and bending free end of tension wire over ferrule as shown. The ferrule is then thoroughly soldered in place without drawing the temper of the tension wire.

New Standard List of Pneumatic Tire Sizes

Together with a Collection of Recently Adopted S. A. E. Standards and Recommended Practices Relating to Tires and Rims

FOR years there has been a movement, fostered by the manufacturers of tires, to reduce the number of different sizes and types of tires called for by car manufacturers. The almost endless variety in which these tires were formerly manufactured made it almost impossible for dealers to keep a complete line in stock, and it was also a burden on manufacturers. Action was taken through the Standards Committee of the S. A. E., which formulated a list of standard sizes. A further impetus was given this movement last fall when the Commercial Economy Board of the Council of National Defense requested the War Service Committee of the American Rubber Industry to formulate a new reduced list of sizes and types of tires. It was then decided to discontinue at once the manufacture of tires of certain types and dimensions, to discontinue another list in November, 1918, another November, 1919, and a further one November, 1920. This will lead to the use, in the not distant future, of only seven regular sizes of automobile pneumatic tires and six over-sizes. It is recommended that manufacturers use as regular equipment of cars only the regular size tires and not over-size ones, as this gives the owner a chance to enlarge his tire equipment without changing rims. The sizes of tires given in the table headed Class A Sizes of Pneumatic Tires are to constitute the permanent list of standard sizes, while the manufacture of all other sizes is to be discontinued by November, 1920.

CLASS A—SIZES OF PNEUMATIC TIRES

(Permanent List)

Nominal Size	Average Tire	Rim Diameter	Type of Rim
30 x 3½	31 x 4	23	Clincher
32 x 3½	33 x 4	25	Straight side
33 x 4	34 x 4½	25	Straight side
34 x 4½	35 x 5	25	Straight side
36 x 6	38 x 7	24	Straight side
38 x 7	40 x 8	24	Straight side
40 x 8	.....	24	Straight side

CLASS B—PNEUMATIC TIRE SIZES

(To be discontinued November, 1920)

Nominal Size	Type of Tread	Type of Rim
30 x 3	Plain and Non-skid	Clincher
32 x 4	Plain and Non-skid	Straight side
32 x 4½	Plain and Non-skid	Straight side
33 x 4½	Non-skid	Straight side
33 x 5	Non-skid	Straight side
34 x 4	Plain and Non-skid	Straight side
35 x 4½	Plain and Non-skid	Straight side
35 x 5	Non-skid	Q. D. clincher
37 x 5	Non-skid	Straight side

CLASS C—PNEUMATIC TIRE SIZES

(To be Discontinued November, 1919)

Nominal Size	Type of Tread	Type of Rim
33 x 4½	Plain	Straight side
35 x 4½	Non-skid	Q. D. clincher
36 x 4½	Non-skid	Straight-side
37 x 5	Non-skid	Q. D. clincher

CLASS D—PNEUMATIC TIRE SIZES

(Discontinued November, 1918)

Nominal Size	Type of Tread	Type of Rim
29 x 4½	Non-skid	Straight side
30 x 3½	Non-skid	Straight side
32 x 3½	Non-skid	Clincher
32 x 3½	Non-skid	Q. D. clincher
32 x 4½	Non-skid	Q. D. clincher
33 x 4	Non-skid	Clincher
33 x 4	Non-skid	Q. D. clincher
33 x 4½	Non-skid	Q. D. clincher
33 x 5	Plain	Straight side
34 x 4½	Non-skid	Q. D. clincher
35 x 4	Non-skid	Straight side
36 x 4½	Plain	Straight side
36 x 4½	Non-skid	Q. D. clincher
37 x 4½	Non-skid	Straight side

CARRYING CAPACITIES AND INFLATION PRESSURES

Tire Width, In.	Max. Load, Lb. per Tire	Inflation Pressure, Lb. per Sq. In.
3	375	45
3½	570	55
4	815	65
4½	1,100	75
5	1,300	80
5½	1,700	85
6	2,000	90
7	2,700	100
8	3,650	110
Motorcycle Tires		
2¼	175	35
3	325	40
3½	400	45

Detachable and Plain Clincher Rims

Valve holes in wood felloe for detachable and plain clincher rims to be same diameter as valve hole in steel rim.

VALVE-HOLE SIZE, AUTOMOBILE RIMS

The valve hole in automobile rims for S. A. E. standard tire sizes shall be ⅝ in. diameter up to 4½-in. rims, inclusive. Valve-hole sizes for 6, 7 and 8-in. rims are yet to be determined.

DEFLECTION AND SET TEST FOR AUTOMOBILE PNEUMATIC TIRE RIMS

The S. A. E. Standard Deflection and Set Test of rims is a pressure test with predetermined deflection under predetermined pressure. The test is made with water pressure.

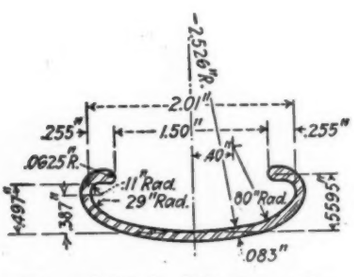
The measurements of deflection for either a clincher or a straight-side rim should be made across the extreme width.

Deflection should be measured from a fixed inflation load of 25 lb. per sq. in. for 3½, 4 and 4½-in. sections, and 50 lb. per sq. in. for 6-in. sizes and larger, up to a predetermined maximum, as follows:

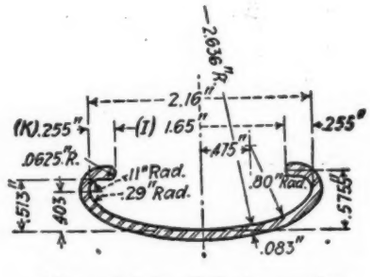
Rim Size Nominal, Inches	Pressure, Pounds	Maximum Deflection, Inches	Total Permanent Set, Inches
3½	140	0.06	0.02
4	160	0.07	0.03
4½	180	0.10	0.06
6	200	0.15	0.06
7	200	0.15	0.06
8	Yet to be determined		

In conducting the tests, measurements of deflection should be made after load increments of 25 or 50 lb. as above are added; at a corresponding set the load should be released.

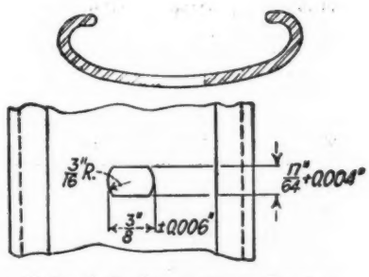
Motorcycle Rim Sections



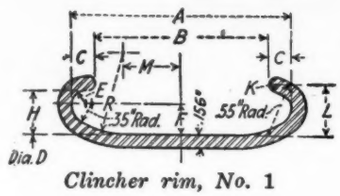
2¼ and 2½-in. B B rim section



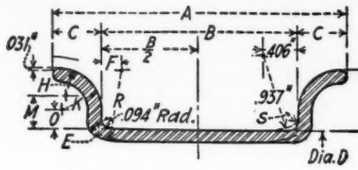
2¾ and 3-in. C C rim section



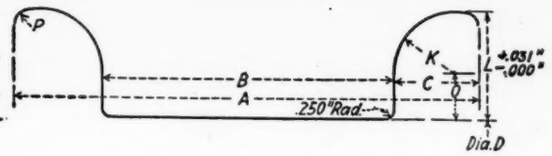
Valve hole for motorcycle rims



Clincher rim, No. 1



Straight side rim, No. 2

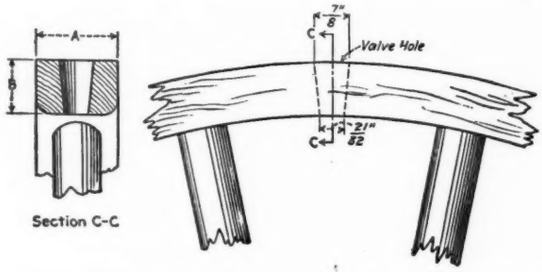


Straight side rim, No. 3

RIMS FOR PNEUMATIC TIRES

Draw No.	Nominal Tire and Rim Size	Rim Dia. (D)	Rim Circum.* (Tire Seat)	Rim, Type	A	B ∓0.047	C	R 0.910	E .1400	F .3400	H 0.50	K 0.0780	L 0.5780	M 0.680	O	P	S ....
1.....	30x3½	23	72.257	Clincher	2.600	2.050	0.275										
2.....	32x3½	25	78.540	Straight Side	3.432	2.312	0.560	0.840	.1875	.2500	0.32	0.5100	0.6870	0.367	0.1990	....	.0625
	33x4	25	78.540	Straight Side	3.888	2.688	0.600	0.840	.1875	.2500	0.34	0.5600	0.7800	0.440	0.2450	....	.0625
	34x4½	25	78.540	Straight Side	4.380	3.120	0.630	1.095	.1875	.3125	0.38	0.6150	0.8750	0.495	0.3030	....	.0625
3.....	36x6	24	75.398	Straight Side	6.330	4.330	1.000	....	....	....	...	0.7187	1.2656	....	0.5469	0.140	....
	38x7	24	75.398	Straight Side	7.000	5.000	1.000	....	....	....	...	0.7187	1.2656	....	0.5469	0.140	....
	40x8	24	75.398	Straight Side	8.500	6.000	1.250	....	....	....	...	0.8750	1.5000	....	0.6250	0.150	....

*Tolerance for rim circumference, ∓0.047 in. All dimensions given in inches.



WOOD FELLOE DIMENSIONS FOR PNEUMATIC TIRE RIMS

Wood Felloe Dimensions

Nominal Tire and Rim Size	†Width (A)	†Depth (B)
30 x 3½	.....	.....
32 x 3½	.....	.....
33 x 4	.....	.....
34 x 4½	.....	.....
36 x 6	3¼	1⅝ ± 1/16
38 x 7	3 29/32	1⅝ ± 1/16
40 x 8	4¼	1⅝ ± 1/16

Dimensions in inches.
†Dimensions not given are to be determined.
NOTE.—The above values correspond to those adopted by the Automotive Wood Wheel Mfrs. Assn.

Bolt Equipment for Side Flanges of Solid Tires*

Nominal Outside Tire Diameter, In.	Diameter Bolt Hole Circle, In.	Number of Bolts
30	22½	6, 9, or 18
32	24½	8, 12, or 24
34	26½	8, 12, or 24
36	28½	8, 12, or 24
38	30½	10, 15, or 30
40	32½	10, 15, or 30
42	34½	10, 15, or 30

*All bolts to be ½ in. (12.7 mm.) diameter.

Edges of Felloe Band

Bands to be rounded on two outside edges with radius not to exceed 1/16 in. and on both inside edges with a radius of 3/16 in.
In measuring the circumference of the band, if there is not an allowance on the tapeline itself, a correction amounting to three times the thickness of the tapeline should be made.
All of the foregoing, so far as pertinent, applies to metal wheels.

INDUSTRIAL TRUCK TIRES

The S. A. E. standard nominal tire diameters for industrial trucks are 10, 16, 20, 22 and 27 in. Industrial truck tire sections recommended by the Association of Railway Electrical Engineers (given for reference only) are as follows:

Wheel Dimensions — Nominal Diameter with Tire	Wheel Dimensions — Diameter of Rim* without Tire	Tire Equipment, 4000-Lb. Truck
10	6.250	3 (Dual)
16	12.125	3½ (Single)
20	16.000	3½ (Single)
22	17.750	3½ (Single)
27	23.500	3½ (Single)

*Permissible tolerance from rim diameters: Minus, 000; Plus, 0.005. All dimensions in inches. The standard of the Association of Railway Electrical Engineers further specify that all tire equipment is to be of the pressed-on type; the depth of tire section including base shall not exceed 2 in.; and the width of wheel rim shall not be less than width of tire seat. This refers to nominal width of seat, which is 6 in. for the 10 in. tire and 3½ in. for the 20, 22 and 27 in. tires.

SECTION DIMENSIONS OF SINGLE AND DUAL WHEELS

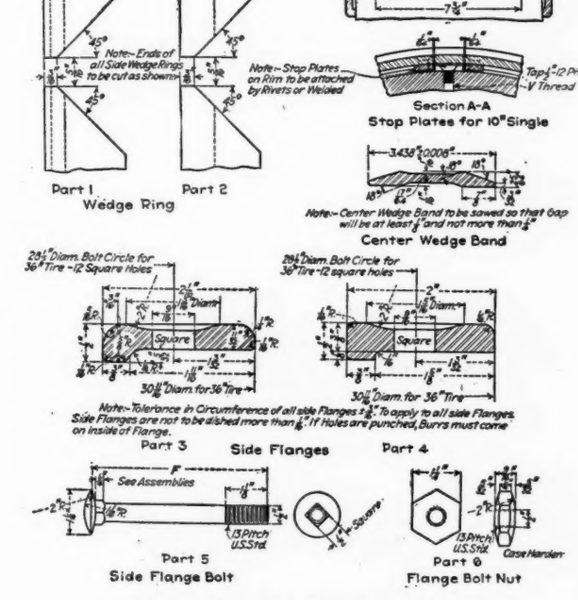
Single Wheels

Nominal Tire Widths, In.	Width of Felloe and Band, In.	Thickness of Steel Band, In.	Minimum Felloe Thickness, In.
2	1¼	¼	1¼
2½	1¾	¼	1¼
3	2¼	¼	1½
3½	2¾	¼	1½
4	3¼	¼	1¾
4½	3¾	⅜	1¾
5	4¼	⅜	2
5½	4¾	⅜	2
6	5¼	⅜	2
6½	*	⅜	2⅛

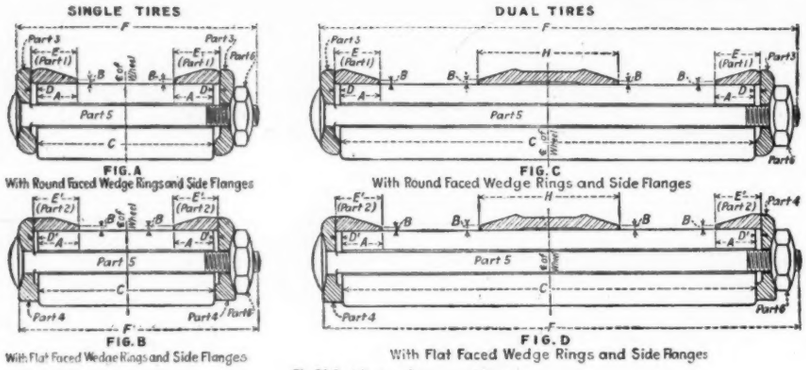
Dual Wheels

2	4	⅜	1¼
2½	5	⅜	1¼
3	6	⅜	1½
3½	7	⅜	1½
4	8	⅜	1¾
4½	9	⅜	1¾
5	10	⅜	2
5½	11	⅜	2
6	12	⅜	2
6½	†	⅜	2⅛

*To be ¾ in. less than nominal width.
†To be twice the nominal tire width.


Note—Lines A, B and C intersect at a common point
30" Diam. for 36" Tire
These dimensions must be exact
30" Diam. for 36" Tire
Part 1
Wedge Ring
Part 2
Note—Ends of all Side Wedge Rings to be cut as shown
Note—To prevent looseness of Screws, punch Metal of Plate into Screw Slots as shown
Note—Stop Plates on Rim to be attached by Rivets or Welded
Section A-A
Stop Plates for 10" Single
Center Wedge Band
Note—Center Wedge Band to be sawed so that Gap will be at least ⅛" and not more than ¼"
28¼" Diam. Bolt Circle for 36" Tire—12 Square Holes
28¼" Diam. Bolt Circle for 36" Tire—12 square holes
Square
30⅝" Diam. for 36" Tire
30⅝" Diam. for 36" Tire
Note—Tolerance in Circumference of all side Flanges ±⅛". To apply to all side Flanges. Side Flanges are not to be dished more than ⅛". If Holes are punched, Burrs must come on inside of Flange.
Part 3
Side Flanges
Part 4
See Assemblies
13 Pitch U.S.Std.
Part 5
Side Flange Bolt
13 Pitch U.S.Std.
Case Harden
Part 6
Flange Bolt Nut

Solid tire demountable rim equipment


SINGLE TIRES
DUAL TIRES
FIG. A
With Round Faced Wedge Rings and Side Flanges
FIG. C
With Round Faced Wedge Rings and Side Flanges
FIG. B
With Flat Faced Wedge Rings and Side Flanges
FIG. D
With Flat Faced Wedge Rings and Side Flanges

Solid tire rim sections

Dimensions for Single Tire Rims

Size	Figure A: A	B	C	D	E	F	†Figure B: D'	E'
4 in.....	31/32	3/32	3¼	5/32	1⅛	4⅝	⅛	1 3/32
5 in.....	31/32	3/32	4¼	5/32	1⅛	5⅝	⅛	1 3/32
6 in.....	31/32	3/32	5¼	5/32	1⅛	6⅝	⅛	1 3/32
7 in.....	31/32	3/32	6¼	5/32	1⅛	7⅝	⅛	1 3/32
10 in.....	31/32	3/32	10	5/32	1⅛	11⅝	⅛	1 3/32

†All other dimensions for Figure B are the same as for Figure A.

Dimensions for Dual Tire Rims

Size	Figure C: A	B	C	D	E	F	H	*Figure D: D'	E'
5 in.....	31/32	3/32	10	5/32	1⅛	11½	3 7/16	⅛	1 3/32
6 in.....	31/32	3/32	12	5/32	1⅛	13½	3 7/16	⅛	1 3/32

*All other dimensions for Figure D are the same as for Figure C.

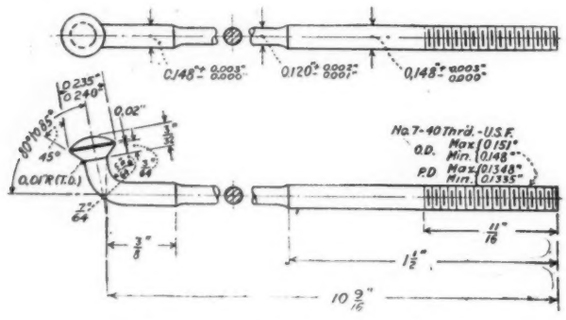
TOLERANCES FOR FELLOE BANDS FOR SOLID TIRES

	Plus	Minus
Band circumference before application	0	1/16
Band circumference after application	1/16	1/32
Width of band	1/32	1/32
Thickness of band	0.006	0.006
Radius of band after application	1/16	1/16

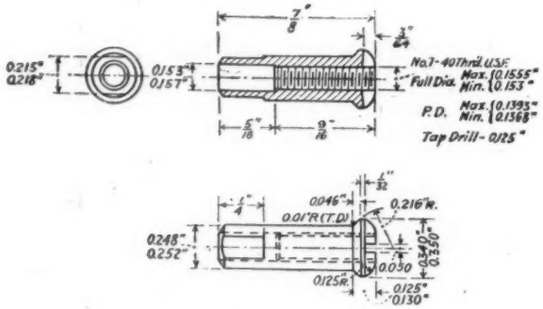
Circumferential deviation must be uniform over entire width of band. Radial deviations must not occur at diametrically opposite points, and there must be no flat spots or kinks in band and finished wheel. Either side of band when laid on a surface plate must not clear more than 1/32 in. at any point.

STANDARDS DIAMETERS OF SOLID TIRES

S. A. E. standard nominal tire diameters are 34, 36 and 40 in.



Motorcycle wheel wire spoke



Motorcycle spoke nipple

MOTORCYCLE SPOKE AND NIPPLE SPECIFICATION

Threads may be either cut or rolled but the unthreaded portion of butt must remain .148 inch + .033, —.000.

The nipple is to be made from free-cutting steel screw stock and is to be finished according to dimensions.

Spoke Wire Specifications

The spoke wire shall have the following chemical content within the limits specified:

Carbon	.40 to .55
Manganese, not under	.50
Phosphorus, not over	.05
Sulphur, not over	.05

Tolerance of Diameter

The nominal wire diameter must be .148 inch + .000 — .001.

Bend Test

The wire must be held firmly in a pair of jaws so that it may be bent over a surface having a radius of one-half the nominal diameter of the wire, and shall stand a test of at least four bends, counted as follows: Holding the free length of the wire loosely between clamps so that it cannot bend except at the holding jaws, it is to be bent 90 deg. over one jaw; this to be counted as one bend. It is then to be bent up to its original position; this to be counted as the second bend. It is then to be bent 90 deg. to the other side (3rd bend) and back to its original position to complete the test.

Tensile Strength

The tensile strength of the wire is to be not less than 140,000 pounds per square inch.

Physical Test—Complete Spoke and Nipple

Tensile Strength

The finished spoke, when held at the bent end in the same manner as by the hub flange in a finished wheel and at the threaded end by a standard nipple with the spoke threads filling all the nipple threads, must sustain a dead load of not less than 1580 pounds.

Torsion Test

This test is not required.

MOTORCYCLE WHEEL AND RIM SPECIFICATION

(Motorcycle, Side and Rear Car Wheels)

	A	B	D	L	I	K
Nominal	6°	7° 30′	2.86	2.93	1.65	.255
Maximum	7° 45′	9° 15′	3.56	3.60	1.80	.263
Minimum	4° 15′	5° 45′	2.20	2.25	1.50	.247

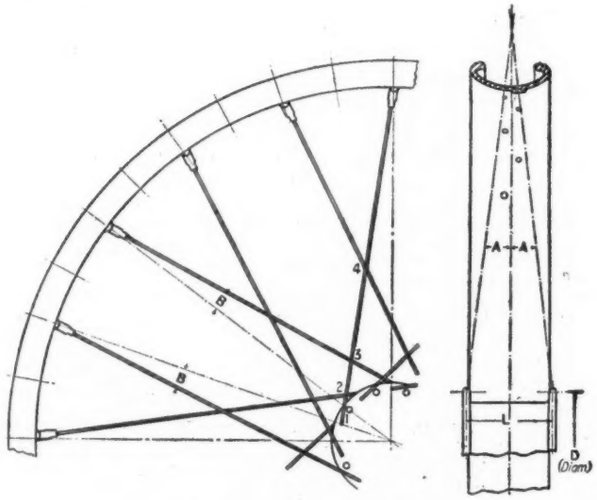
Chemical content of steel

Carbon	.10 to .15
Sulphur, not over	.05
Phosphorus, not over	.05
Manganese	.40 to .60

Dimensions in inches.

Tolerance for circumference of wire wheel rim after lacing

Circumference =68.722+.047 (3/64) in. or —.141 (9/64) in.



Motorcycle wheel lacing

Tractor Production Past and Present

Output Doubled During Each of the Last Two Years—Two and Three Plow Tractors Form Bulk of Production—Government Figures of Production, Domestic Sales and Exports

EVERYBODY knows that the production of farm tractors has increased by leaps and bounds during the past few years, but actual figures of production have been impossible to obtain until recently. Farm tractors do not have to be registered with the authorities like automobiles, and the only source of information regarding production is the manufacturers. But obtaining reliable figures from the makers themselves is not as easy a matter as might appear, especially when the attempt is being made by a publication, which immediately gives the manufacturer the impression that the figures are to be published broadcast and may be used by his competitor to his own injury.

But in order to judge properly the growth of the tractor industry, and the capacity of the market for absorbing tractors, it is highly important that such figures should be made available. We do not mean the production figures of individual manufacturers but those of the industry as a whole.

Fortunately the United States Government, when it became necessary to decide how much steel should be allowed the tractor industry, took it upon itself to gather statistics regarding production, domestic sales and exports during the years 1916, 1917 and the first half of 1918. The investigation was made pursuant to the President's Proclamation of May 14, 1918, relating to the farm equipment industry, which was issued under the authority of the Food Control Act.

Number of Tractors Manufactured

1916	29,670
1917	62,742
Jan. 1 to June 30, 1918	58,543
Total for 1916, 1917 and first half of 1918	150,955

Number of Tractors Sold

To Users

1916	27,819
1917	49,504

To Exporters

1917	14,854
1918, first 6 months	15,610
Number of tractors on hand, in transit, or in hands of dealers at time of report (August, 1918)	11,388

It will be seen from the figures published in tabular form herewith that the production of farm tractors increased more than 100 per cent in 1917 as compared with 1916—111 per cent to be accurate—and during the first half of 1918 the production was almost equal to that of the whole of 1917.

What the production was during the last half of 1918 can only be conjectured. If no obstacles had been encountered it would have seen a further substantial growth, but practically all of the factories met with great difficulty in securing materials. In fact, from Oct. 1 on, manufacturers were restricted to 75 per cent of the output of the previous year, which regulation was, however, withdrawn toward the end of the year. Aside from this official direct curtailment of production, there was an indirect curtailment, in some cases much more drastic than the direct one, which was due to the monopolization of forge and foundry output by munitions plants. Tractor manufacturers had a comparatively high priority rating among the industries, but, as one manufacturer put it, what is the good of a B-1 rating when all the foundries are loaded up with Class A stuff?

Taking the natural tendency toward expansion and the increasing demand for tractors among farmers, together with these restrictions on output, it seems reasonable to assume that the tractor output during the last half of 1918 was about the same as during the first half, and that the total production of the year was in the neighborhood of 125,000.

The 15-16 and 18-20 hp. ranges may be considered to cover the two-plow tractor, and the 20-26 hp. range the three-plow tractor. These are the sizes produced in the greatest numbers. Undoubtedly a much greater number of manufacturers are represented in the 22-26 hp. than in the 18-20 hp. class.

The curve of farm tractor production thus shows a rapidly rising tendency. In fact, the figures for the past three years form substantially a geometrical series. But what of the future? If this rate of progression is to be continued it will be only a few years till the tractor industry has attained a status commensurate with that of the automobile industry. There are several factors which will tend to maintain the rate of progress. One of these is the continued scarcity of food throughout the world, which will tend to maintain the prices of farm products and encourage farmers to make investments in equipment enabling them to increase their production. On the other hand, we must consider the fact that the phenomenal growth in the sales of tractors has riveted the attention of industrialists upon this industry and that many of the firms which until recently were engaged on Government war work and have been left with well equipped plants but without manufacturing lines, will seek their salvation in this new industry.

Of course, not all the currents of the changing times will favor the tractor. Farm help will not be as scarce this coming year, when most of our army is demobilized, as it was last year. There will also be more competition again in the markets of Europe from the more distant grain exporting countries such as Argentina and Australia. It is not believed, however, that these latter factors will seriously retard the forward march of the agricultural tractor industry. The main thing is that leading farmers have been convinced of the practical utility of the gas tractor.

Engineering improvement has been rapid during the past two years and will continue at an increasing rate. Next year's tractor will be more economical, more durable, handier and more comfortable than last year's. Engineers have made the tractor a practical farm implement and we may now safely leave it to the sales managers to find increasing markets for this new product of the automotive industries.

To the student of the tractor development the following figures, representing the number of tractors of different horsepower ratings turned out during the first half of 1918, will be of interest: 10-12 hp., 2714; 15-16 hp., 3716; 18-20 hp., 24,128; 22-26 hp., 20,658; 27 hp., 400; 28-30 hp., 2772; 35-36 hp., 1495; 40-50 hp., 1025; 60-80 hp., 1049. These figures seem to indicate that the future belongs to the two and three-plow tractor.

Detailed Technical Specifications

Tabulated Data on 98 Different Makes of American 69 Manufacturers, With Makes of Principal Ignition System, Air Cleaner,

Name and Model	Price	Plow Capacity	Hp. Rating	Engine Make	No. of Cylinders Bore and Stroke	Engine Type	Cylinders Cast	R.P.M.	Make of Governor	Type of Governor	Engine Weight	Lubrication System	Lubricator Make	Oil Pump Type	Ignition System	Impulse Starter	Carbureter Make	Water Injected with Fuel	Fuel Feed	Fuel Tanks and Capacity	Air Cleaner Make
Acme		3	12-24	Beaver	4-4½x6	V	Block	800				Pressure			Mag	Yes	King	No		3½G-20K	Donaldson
Allis-Chalmers		4	15-30	Own	4-4¾x6½	V	Block	830	Own	Fball		Circ	Detroit	Gear	Mag	Yes		Yes	Grav		Bennett
Allis-Chalmers		3	10-18	Own	2-5½x7	O	Singly	720	Own	Fball		Splash	Detroit	Gear	Mag	Yes	King	Yes	Grav	5G-20K	Bennett
Allis-Chalmers		1	6-12	Own	4-3½x4½	V	Block	800	Own	Fball		Splash-Pr		Plun	Mag	No			Grav	10G	Bennett
Allwork		3	14-28	Own	4-5 x6	V	Singly	800	Own	Fball	1000	Circ-Sp		Plun	Mag	Yes	King	No	Grav	5G-25K	Bennett
Appleton	$1800	3	12-20	Buda	4-4¼x4½	V	Block	1000	Pick	Fball	800				Mag		Scheb	Yes	Grav	5G-20K	Opt
Aultman & Taylor		6	22-45	Own	4-5½x8	H	Block	600	Own	Fball		Circ-Sp	Detroit	Plun	Mag	No	King	Yes	Pump	10G-35K	
Aultman & Taylor		10	30-60	Own	4-7 x9	H	Pairs	500	Own	Fball		Circ-Sp	Detroit	Plun	Mag	No	King	Yes	Pump	20G-60K	
Aultman & Taylor		4	15-30	Waukesha	4-4¾x6¾	V	Pairs	800	Wauk		875	Circ-Sp		Gear	Mag	Yes	King	Yes	Gra	6G-16K	Bennett
Avery				Own	4-3 x4	V		1200							Mag		Zeph			G-K	Bennett
Avery		3		Own	2-5½x6	O		600							Mag		King			G-K	Bennett
Avery		4		Own	2-6½x7	O		570							Mag		King			G-K	Bennett
Avery		4		Own	4-5½x6	O		650							Mag		King			G-K	Bennett
Avery		6		Own	4-6½x7	O		500							Mag		King			G-K	Bennett
Avery		8-10		Own	4-7¾x8	O		500							Mag		King			G-K	Bennett
Bates Steel Mule	D	3	12-20	Erd	4-4 x6	V	Block	900	Own			Circ-Sp		Plun	Mag	Yes	Bennett	Yes	Grav	2½G-11K	Bennett
Bates		3	15-25	Own	4-4½x5½		Block	800	Own		1000	Circ		Plun	Mag		Own			2G-15K	
Beltrail	B	3	12-20	Waukesha	4-3¾x5½	V	Block	950	Wauk		650	Splash		Gear	Mag	Yes	Ensign	Yes	Grav	2G-18K	Bennett
Bull		1075	3	12-24	Toro	2-5½x7	O	Singly	750	Own	Fball	1098	Circ-Sp	Own	Plun	Mag	Yes	King	Yes	Grav	3½G-18½K	Donaldson
Chase		1200	3	9-18	Buda	4-3¾x5½	V	Block	900	Pierce		600	Circ-Sp		Gear	Mag	Yes	Holley		Grav	2G-17K	Bennett
Cleveland	H	1585	2	12-20	Weidely	4-3¾x5½	V	Block	1200	Own	Cent	700	Pressure	Weidely	Gear	Mag	Yes	King	No	Grav	1G-12K	Own
C.O.D	B	1395	3	13-25	Own	2-6½x7	O	Singly	550	Own	Throt		Pressure	Detroit	Plun	Mag	Yes	King	Yes	Grav	5G-18K	
Coleman		1750	3	16-30	Climax	4-5 x6½	V	Pairs	750	Climax		860	Circ-Pr		Ind	Mag	Yes	Stmbg	Yes	Grav	3G-17K	Bennett
Common Sense	D	2200	4	20-40	Hersh-Sp	8-3¼x5	V	Block	1200	Pick	Fball	600	Circ-Pr		Gear	Mag	Yes	King	No	Grav	37G	Own
Craig			3	15-25	Beaver	4-4¾x6	V	Block	950	Pharo	Hyd	1050	Splash-Pr			Mag	Yes	Stmbg	No	Grav	3G-22K	Own
Dart	Blue Jay	1750	3	15-30	Buda	4-4¼x5½	V	Block	1050	Pierce	Cent	800	Circ-Pr		Gear	Mag	Yes	Zenith	No	Grav	25G	Bennett
Dill		2480	3	20-	Cont	4-4½x5½	V	Pairs	1000	Pierce		740	Splash-Pr		Plun	Mag	No	King	No	Grav	15G	Donaldson
Eagle	F	1853	4	16-30	Own	2-8 x8	H	Pairs	425	Own	Throt	2750		M-Kipp		Mag	Yes	Linga	Yes	Grav	5G-18K	Bennett
Eagle	F	1545	3	12-22	Own	2-7 x8	H	Pairs	425	Own	Throt	2205	Pressure	M-Kipp	Plun	Mag	Yes	Linga	Yes	Grav	4G-12K	Bennett
Elgin		1385	3	12-25	Erd	4-4 x6	V	Block	900	Erd	Fball	850	Circ-Sp		Plun	Mag		King	Yes	Grav	5G-18K	Bennett
Emerson-Brantingham	AA		3	12-20	Own	4-4¾x5	V	Pairs	900	Own	Cent	1000	Circ-Sp		Plun	Mag	Yes		Yes	Grav	4G-20K	Bennett
Emerson-Brantingham			2	9-16	Own	4-4½x4½			800							Mag		Bennett				Bennett
Emerson-Brantingham			3	12-20	Own	4-4¾x5			850							Mag		Bennett				Bennett
Emerson-Brantingham			6	20-35	Own	4-5 x7			700							Mag		Bennett				Bennett
Emerson-Brantingham			10	40-65		4-7¼x9			500							Mag		Bennett				Bennett
Farm Horse		1485	4	16-30	Climax	4-5 x6½	V	Pairs	800	Climax	Fball	1050	Splash-Pr			Mag	Yes	Bennett	No	Grav	5G-18K	Bennett
Farquhar			4	15-25	Buda	4-4½x6	L	Block	900			900	Pressure			Mag		King		Grav	5G-25K	Bennett
Farquhar			5	18-	Own	4-6 x8	I	Pairs	550				Splash	Detroit		Mag		King		Grav	5G-30K	
Farquhar			7	25-	Own	4-7 x8	I	Pairs	550				Splash	Detroit		Mag		King		Grav	5G-30K	
Fitch	3	2500	4	18-26	Beaver	4-4½x6	V	Block	950	Lauson		1080	Pressure			Mag	Yes	King	No	Grav	2G-25K	Bennett
Fordson			2	12-20	Own	4-4 x5		Block	1000				Splash-Gr			Mag		Holley		Grav	20-K	
Franks			2	8-16	Gray	4-3½x5	V	Singly	1000	Monarch						Mag	Yes					
Frick			3	12-25	Erd	4-4 x6	V	Block	900	Pick			Splash			Mag	Yes	King			3G-20K	Bennett
Gile	Q	2000	3	20-35	Own	4-4¾x6½	V	Block	875		Cent	1000	Circ-Pr		Gear	Mag	Yes		No	Grav	38G	Bennett
Gray		2250	4	18-36	Waukesha	4-4¾x6¾	V	Pairs	850	Wauk	Cent	950	Circ-Sp		Gear	Mag	Yes	Bennett	No	Grav	34G	Bennett
Hackney			2	12-20	Field	4-3¾x5	O	Pairs	1000	Field	Cent	375	Circ-Pr	Field	Plun	Mag	Yes	King	No	Grav	2G-20K	Bennett
Hackney			3	15-30	Climax	4-5 x6½	V		800	Pierce	Cent	1450	Circ-Pr	Detroit	Plun	Mag	Yes	King	No	Grav	2G-10K	Bennett
Hart-Parr		1395	3	-30	Own	2-6½x7	H	Singly	750	Own	Cent	1300		M-Kipp	Plun	Mag	Yes	Scheb	Yes	Grav	23K	Own

Abbreviations

Bat—*Battery*
Cent—*Centrifugal*
Circ—*Circulating*
Circ-Pr—*Circulating Pressure*
Circ-Sp—*Circulating Splash*
Cont—*Contracting*
Elec—*Electric*
Expand—*Expanding*
Fball—*Flyball*
Fric—*Friction*
Grav—*Gravity*
H—*Horizontal*
Hyd—*Hydraulic*
I—*Valve-in-head*
Ind—*Individual*
L—*L-Head*
Mag—*Magneto*
O—*Opposed*
Plun—*Plunger*
Splash-Gr—*Splash Gravity*

# of Gasoline Farm Tractors for 1919

Gasoline and Kerosene Farm Tractors Produced by Parts, Including Engine, Governor, Lubricator, Gearset, Clutch and Axle

Radiator Make	Cooling System Capacity	Cooling Fluid	Fluid Circulation	Belt Pulley Dia. Face and R.P.M.	Gearset Make	Clutch Make	Clutch Type	No. Forward Speeds	Differential Lock	Final Drive	Plowing Speed	No. Driving Wheels	Dia. and Face	No. of Tracks	Drive Wheel Axle Type	No. Non-Drive Wheels	Steering Arrangement	Frame Material	Wheelbase	Total Weight	Name and Model
.....	.....	.....	Pump.	14-8-800	Own...	Own....	Shoe....	2	No...	Gear..	3½	2	54x12	.....	.....	2	Knuckle..	Struct...	90	6,000	Acme
Own	.....	Water....	Pump.	15-7.....	Own...	.....	Shoe....	2	No...	Gear..	2⅝	2	48x12	.....	Live...	2	Knuckle..	.....	81	5,300	Allis-Chalmers
.....	.....	Water....	Pump.	14½-6½-720	Own...	Own....	Shoe....	1	No...	Gear..	2⅜	2	60x12	.....	Sta....	1	.....	Cast....	96	4,800	Allis-Chalmers
Own	.....	Water....	Ther..	.....	Own...	B & B..	Disk....	1	No...	Rim	.....	2	48x 6	.....	.....	.....	.....	.....	.....	1,850	Allis-Chalmers
Perfex...	13	Water....	Pump.	12½-7-800	Own...	Own....	Plate....	2	No...	Gear..	2⅜	2	48x12	.....	Live...	2	Knuckle..	Channel.	80	4,800	Allwork
Spirex...	8	Water....	Pump.	12-7½-825	Nuttall.	B & B..	Disk....	.....	No...	Gear	.....	2	54x12	.....	Live...	2	Knuckle..	Steel....	102	.....	Appleton
Own	.....	Water....	Pump.	....-1560....	Own...	Own....	.....	2	No...	Gear..	2⅜	2	70x20	.....	Live...	2	Swinging.	Steel....	102	.....	Aultman & Taylor
Own	.....	Water....	Pump.	24-11.....	Own...	Own....	.....	.....	No...	Gear..	.....	2	90x24	.....	Live...	2	Swinging.	Steel....	135	.....	Aultman & Taylor
Hooven..	.....	Water....	Pump.	3-1¾.....	Own...	Own....	.....	1	No...	Gear..	2½	2	70x20	.....	Live...	2	Knuckle..	Channel.		6,579	Aultman & Taylor
.....	.....	.....	.....	9 -..-1000	Own...	Own....	.....	4	.....	Gear..	1½	2	30x..	.....	.....	.....	.....	.....	.....	2,150	Avery
.....	.....	.....	.....	18 -..- 600	Own...	Own....	.....	2	.....	Gear..	1¾	2	50x..	.....	.....	.....	.....	.....	.....	4,900	Avery
.....	.....	.....	.....	19½-..- 570	Own...	Own....	.....	2	.....	Gear..	1¾	2	56x..	.....	.....	.....	.....	.....	.....	7,500	Avery
.....	.....	.....	.....	18 -..- 650	Own...	Own....	.....	2	.....	Gear..	2	2	65x..	.....	.....	.....	.....	.....	.....	9,250	Avery
.....	.....	.....	.....	22 -..- 500	Own...	Own....	.....	2	.....	Gear..	2	2	69x..	.....	.....	.....	.....	.....	.....	12,500	Avery
.....	.....	.....	.....	26 -..- 500	Own...	Own....	.....	2	.....	Gear..	1¾	2	87½x..	.....	.....	.....	.....	.....	.....	22,000	Avery
Modine..	8	Water....	Pump.	12-..-725...	Own...	B & B..	.....	2	No...	Gear..	3½	.....	.....	2	Live...	2	Knuckle..	Channel.	.....	4,500	Bates Steel Mule ..... D
Own	.....	.....	.....	.....	.....	.....	.....	.....	.....	Gear..	2½	2	50x14	.....	.....	2	.....	Struct...	.....	4,000	Bates
Sparks..	5	Water....	.....	10-6-950....	Own...	Own....	Plate....	2	.....	Gear..	3½	...	.....	1	.....	...	Knuckle..	Channel.	.....	4,500	Beltrail ..... B
Own....	8	Water....	Pump.	12-6½-750..	.....	.....	Band....	1	.....	.....	2⅜	1	60x14	.....	Sta....	2	.....	Steel....	107	4,996	Bull
Perfex...	10	Water....	Pump.	10-8-900....	Own...	Burman.	Shoe....	2	Yes..	Gear..	3	2	48x12	.....	Sta....	1	.....	Channel.	120	4,800	Chase
McCord.	8	Water....	Pump.	8-6-1200	Own...	B & B..	Disk....	1	No...	Gear..	3½	...	.....	2	Sta....	.....	.....	Steel....	.....	3,175	Cleveland ..... H
S.H.J...	35	Water....	Pump.	18-8-550....	Own...	Own....	Gear....	1	No...	Axle..	2½	2	70x12	.....	Live...	2	Swinging.	Struct...	108	6,500	C.O.D ..... B
Modine..	14	Water....	Pump	12-7-2100...	Own...	Own....	Expand..	1	No...	Axle..	2⅜	2	46x10	.....	.....	2	Swinging.	I-beam..	120	4,925	Coleman
Todd...	10	Water....	Pump.	22-8-400...	Own...	Own....	Shoe....	2	No...	Chain.	3	1	62x24	.....	Live...	2	Knuckle..	Struct...	108	6,000	Common Sense ..... D
Modine..	7	Water....	Pump.	11-8-950	Own...	.....	Disk....	2	No...	Axle..	4	2	44x12	.....	Live...	2	Knuckle..	Steel....	88	4,500	Craig
Modine..	10	Water....	Pump.	12-6-750 ...	.....	.....	.....	3	No...	.....	2½	2	40x12	.....	Rigid..	2	Knuckle..	Channel.	77	4,500	Dart ..... Blue Jay
Eureka .	11	Water	Pump.	.....	Cotta..	B & B..	Plate ...	3	No...	Chain.	3	2	42x36	.....	Rigid..	2	Knuckle..	Struct..	148	4,400	Dill
Perfex...	15	Water....	Pump.	24-10-425...	Own...	Own....	Fric....	2	No...	Gear..	3	2	52x12	.....	Sta....	2	Swinging.	Channel.	88	7,100	Eagle ..... F
Perfex...	8	Water....	Pump.	20-8½-420..	Own...	Own....	Fric....	2	No...	Gear..	3	2	48x12	.....	Sta....	2	Swinging.	Channel.	81	5,860	Eagle ..... F
.....	6	Water....	Pump.	9-8-1800...	Own...	Own....	Fric....	6	No...	Chain.	3½	2	42x10	.....	Sta....	2	.....	Pressed..	87	3,300	Elgin
Modine..	.....	Water....	Pump.	12-6⅜-900..	Own...	Own....	Cone....	2	No...	Gear	2½	2	54x12	.....	Live...	2	Knuckle..	Struct...	87	4,350	Emerson-Brantingham ... AA
.....	.....	.....	.....	12-..-800..	.....	Own....	.....	2	.....	Gear..	2⅜	.....	.....	.....	.....	.....	.....	.....	.....	4,260	Emerson-Brantingham
.....	.....	.....	.....	12-..-708..	.....	Own....	.....	3	.....	Gear..	3⅜	.....	.....	.....	.....	.....	.....	.....	.....	6,500	Emerson-Brantingham
.....	.....	.....	.....	16-..-597..	.....	Own....	.....	2	.....	Gear..	2¼	.....	.....	.....	.....	.....	.....	.....	.....	9,700	Emerson-Brantingham
.....	.....	.....	.....	22-..-500..	.....	Own....	.....	1	.....	Gear..	2	.....	.....	.....	.....	.....	.....	.....	.....	23,000	Emerson-Brantingham
Modine..	10	Water....	Pump.	14-8-800....	Own...	Burman.	Shoe....	2	.....	Chain.	3½	2	48x26	.....	.....	2	Knuckle..	Channel.	84	4,850	Farm Horse
Perfex...	.....	Water....	Pump.	14-7-800....	Nuttall.	Own....	Cone....	2	.....	Gear..	4	....	54x14	....	Live...	....	.....	.....	90	6,000	Farquhar
Own....	.....	Water....	Pump.	32-9-275....	.....	Own....	Fric....	2	.....	Gear..	2⅝	....	84x20	....	Dead...	....	.....	.....	132	16,000	Farquhar
Own....	.....	Water....	Pump.	32-9-275....	.....	Own....	Fric....	2	.....	Gear..	2⅝	....	84x20	....	Dead...	....	.....	.....	132	19,000	Farquhar
Perfex...	27	Water....	Pump.	14-12-600...	Cotta..	B & B..	Disk....	3	No...	Gear..	2½	4	42x12	.....	Live...	....	Swinging.	Channel.	77	6,000	Fitch 3
.....	.....	Water....	Ther..	.....	Own...	Own....	Disk....	3	.....	Worm.	2¾	2	42x12	.....	.....	2	.....	.....	63	.....	Fordson
.....	.....	.....	.....	.....	.....	.....	.....	2	.....	Chain.	3	2	44x 6	.....	Live...	....	.....	Channel.	72	3,500	Franks
Perfex...	8	.....	Pump.	.....	Nuttall.	Own....	.....	2	.....	Rim..	3⅛	2	60x10	.....	Live...	2	Knuckle..	Struct...	92	.....	Frick
Own....	12	Water....	Pump.	16-8-500....	Own...	Own....	Disk....	2	No...	Axle..	2¾	2	60x12	.....	Live...	2	Knuckle..	Cast....	96	6,800	Gile ..... Q
S.H.J...	.....	Water....	Pump.	11-8-850....	Own...	Own....	Cone ...	2	No...	Chain.	2½	1	54x54	.....	Live...	2	Knuckle..	Struct...	104	6,060	Gray
Own....	15	Water....	Pump.	16-8-1000...	Own...	.....	.....	1	Yes..	Gear..	2⅞	2	48x 8	.....	Rigid..	2	Knuckle..	Struct...	78	2,800	Hackney
Own....	10	Water....	Pump.	42-8-280....	Own...	Own....	Expand..	2	No...	Gear..	3	2	60x14	.....	Sta....	1	Knuckle..	Channel.	114	7,400	Hackney
Perfex...	9	Water....	Pump.	14-8-750....	Own...	Own....	Cont....	2	No...	Gear..	3	2	52x10	.....	Live...	2	Knuckle..	Struct...	89	5,030	Hart-Parr

Splash-Pr—*Splash Pressure*
Sta—*Stationary*
Struct—*Structural Steel*
T—*T-Head*
Throt—*Throttle*
V—*Vertical*

Vac—*Vacuum*

Equipment

B & B—*Borg & Beck*
Cont—*Continental*

Hersh-Sp—*Herschell-Spillman*
King—*Kingston*
M-Kipp—*Madison Kipp*
Pick—*Pickering*
Rayfld—*Rayfield*

Scheb—*Schebler*
S.H.J.—*Shotwell-Hobart-Johnson*
Sparks—*Sparks-Withington*
Stmbg—*Stromberg*
Wauk—*Waukesha*

Detailed Technical Specifications of Gas

Name and Model	Price	Plow Capacity	Hp. Rating	Engine Make	No. of Cylinders, Bore and Stroke	Engine Type	Cylinders Cast	R.P.M.	Make of Governor	Type of Governor	Engine Weight	Lubrication System	Lubricator Make	Oil Pump Type	Ignition System	Impulse Starter	Carbureter Make	Water Injected with Fuel	Fuel Feed	Fuel Tanks and Capacity	Air Cleaner Make
Heider D	1070	2	9-16	Waukesha	4-4¼x5¾	V.	Pairs	800	Wauk	Cent		Circ-Sp.		Gear	Mag	Yes	King	Yes	Grav	7G-14K	Bennett
Heider C	1395	3	12-20	Waukesha	4-4½x6¾	V.	Pairs	750	Wauk	Fball	865	Circ-Sp.		Gear	Mag	Yes	King	Yes	Grav	7G-14K	Bennett
Hession D	1695	3	12-24	Erd	4-4 x6	I.	Block	1000	Pick	Cent	800	Splash-Pr.		Plun	Mag		King	Yes	Grav	3G-15K	Bennett
Hollis M	1375	4	15-25	Light	4-3¼x4½	V.	Block	1650	Pierce	Cent	352	Circ-Sp.		Plun	Mag		Zenith	No	Vac	1G-30K	Bennett
Holt 45			25-45	Own	4-6 x7	V.	Singly	500	Own	Fball	2300	Circ-Sp.	M-Kipp	Gear	Mag	Yes	King	No	Vac	48½G	Donaldson
Holt 75			50-75	Own	4-7½x8	V.	Singly	550	Own		3375	Circ-Sp.	M-Kipp	Gear	Mag	Yes	King	No	Vac	74G	Donaldson
Huber Light 4	1385	3	12-25	Waukesha	4-4¼x5¾	V	Pairs	900	Wauk	Cent	650	Circ-Sp.		Gear	Mag	Yes	King	Yes	Grav	3G-21K	Own
Hudson K	1985	4	15-30	Buda	4-4½x6	V	Block	1000	Simplex	Cent	900	Pressure		Plun	Mag	Yes	Rayfield	No	Grav	35G	Holley
Illinois C	2250	4	18-36	Climax	5x6½	V	Pairs	800	Climax	Fball	1000	Pressure		Plun	Mag	Yes	Stmbg	No	Grav	1½G-18K	Bennett
Imperial E	4500	12	40-70	Own	4-7½x9	H	Singly	400	Pick		4200	Pressure	Detroit	Plun	Mag	Yes	King	Yes	Opt	18G-70K	Bennett
Indiana D	900	1	6-12	LeRoi	4-3½x4½	V.	Block	1000			350	Circ-Sp.					King	No	Grav		Bennett
I.H.C. International 8-16			8-16	Own	4-4 x5	V.	Block	1000	Own	Fball		Pressure	M-Kipp						Grav	1G-10K	
I.H.C. Titan			10-20	Own	2-6½x8	H	Pairs	500	Own	Fball		Pressure	M-Kipp		Mag		Own		Pump	16K	
I.H.C. Mogul		3	10-20	Own	1-8½x12	Opt	Singly	400	Own	Fball		Pressure	M-Kipp		Mag	Yes	Own			13K	
I.H.C. International			15-30	Own	4-5¼x8	H	Pairs	575	Own	Fball		Pressure	M-Kipp		Mag		Own			24K	
Interstate Plowman	1595	3	13-30	Buda	4-4¼x5½	V	Block	900	Own	Fball	750	Splash		Plun	Mag	Yes	Bennett	Yes	Grav	3G-18K	Bennett
Interstate Plowman	1895	4	15-30	Buda	4-4½x6	V	Block	900	Own	Fball	925	Pressure		Gear	Mag	Yes	Bennett	Yes	Grav	3G-18K	Bennett
LaCrosse Happy Farmer F	1150	3	12-24	Own	2-6 x7	H	Block	750	Own	Fball		Pressure	M-Kipp		Bat		King	Yes	Grav	2G-13K	Own
LaCrosse G	1250	3	12-24	Own	2-6 x7	H	Block	750	Own	Fball		Pressure	M-Kipp		Bat		King	Yes	Grav	2G-13K	Bennett
Lauson	1985	4	15-25	Beaver	4-4½x6	V	Block	950	Own	Fball		Circ-Sp.		Gear	Mag	Yes	King	No	Grav	13½G-13½K	Orem
Leader B		3	12-20	Own	4-6¼x6	O.	Singly	800	Own	Fball	900	Pressure	Detroit		Mag	Yes	King	Yes	Grav	½G-20K	Own
Leader C		6	18-36		4-5 x7½	V.	Block	700			1400	Pressure	Detroit		Mag	Yes	King	Yes	Grav	2G-20K	
Little Giant B	1950	4	16-22	Own	4-4½x5	V	Pairs	900	Own	Fball	850	Circ-Sp.		Gear	Mag	Yes	King	Yes	Grav	5G-25K	Own
Little Giant A	2900	6	26-35	Own	4-5½x6	V	Pairs		Own	Fball	1200	Circ-Sp.		Gear	Mag	Yes	King	Yes	Grav	5G-35K	Own
Maxim A	1685	3	12-24		4-4¼x5½	V	Block	950	Own		700	Circ-Sp.		Gear	Mag	Yes	Holley	No	Grav	1G-15K	Bennett
Moline Universal D	1500	2	9-18	Own	4-3½x5	V	Block		Remy	Elec	610	Circ-Pr.		Gear	Bat		Holley	No	Grav	15G	Bennett
Monarch Lightfoot B	1200	2	6-10	Kermath	4-4 x4	V	Block	900	Own	Fball	400	Splash-Pr.		Gear	Mag		King	Yes	Grav	1G-9K	Bennett
Monarch Neverslip M	2050	3	12-20	Erd	4-4 x6	V	Block	850	Erd	Fball	750	Circ		Plun	Mag	Yes	King	Yes	Grav	2G-23K	Bennett
Monarch Neverslip N	2350	4	18-30	Beaver	4-4¾x6	V	Block	800	Beaver	Fball	1000	Splash-Pr.		Gear	Mag	Yes	King	Yes	Grav	2G-23K	Bennett
National E	1075	2	9-16	Waukesha	4-3½x5¼	V	Block	1000	Wauk	Throt	615	Splash		Plun	Mag	No	Bennett	Yes	Grav	10G-20K	Bennett
National F	1375	3	12-22	Waukesha	4-4¼x5¾	V	Pairs	900	Wauk	Throt	660	Splash		Plun	Mag	Yes	King	Yes	Grav	10G-24K	Bennett
Nilson Junior	1775	4	16-25	Waukesha	4-4¼x5¾	V	Pairs	900	Wauk		630	Circ-Sp.		Plun	Mag	Yes	King	Yes	Grav	2G-21K	Bennett
Nilson Senior	2475	5	24-36	Waukesha	4-4¾x6¾	V		800	Wauk		840	Circ-Sp.		Plun	Mag	Yes	King	Yes	Grav	3G-28K	Bennett
Parrett H		3	12-25	Buda	4-4¼x5½	V	Block	1000	Own	Cent	800	Pressure		Gear	Mag	Yes	Stmbg	No		5G-20K	Bennett
Peoria J		3	12-25	Climax	4-5 x6½	V	Pairs	750	Climax	Fball	960	Circ		Gear	Mag	Yes	Stmbg	No		5G-20K	Bennett
Port Huron		3	12-25	Erd	4-4 x6	B	Block	900	Pick	Throt	800	Circ-Sp.		Plun	Mag		King	No	Grav	5G-25K	Bennett
Prairie Dog L	1150	2	9-13	Waukesha	4-3¾x5¼	V	Block	950	Wauk	Fball	550	Circ		Gear	Mag	Yes	Bennett		Grav	12G	Bennett
Reed		2	10-20	Waukesha	4-4 x5¾	V	Pairs	1100	Wauk	Fball		Splash		Gear	Mag	Yes	King	No	Grav	4G-16K	Bennett
Reed		3	15-30	Waukesha	4-4¼x5¾	V	Pairs	1000	Wauk	Fball		Splash		Gear	Mag	Yes	King	No	Grav	4G-16K	Bennett
Royer	1650	3	12-25	Erd	4-4 x6	V	Block	900	Pick	Fball	850	Circ-Sp.		Plun	Mag	Yes	King	No	Grav	3G-16K	Own
Rumely Oil Pull		3	12-20	Own	2-6 x8	H	Block	550	Own	Cent		Splash-Pr.	M-Kipp		Mag	Yes	Own	Yes	Pump	1G-20K	Donaldson
Rumely Oil Pull		4	13-20	Own	2-7 x8½	H	Block	550	Own	Cent	2000	Splash-Pr.	M-Kipp		Mag	Yes	Own	Yes	Pump	1G-34K	Donaldson
Rumely Oil Pull		5	20-40	Own	2-8 x10	H	Singly	450	Own	Cent		Splash-Pr.	M-Kipp		Mag	Yes	Own	Yes	Pump	1G-41K	Donaldson
Rumely Oil Pull		8	30-60	Own	2-10 x12	H	Singly	375	Own	Cent	7500	Splash-Pr.	M-Kipp		Mag	No	Own	Yes	Pump	3G-70K	None
Samson Sieve-Grip S-25	1750	3	12-28	Own	4-4¼x6¾	V	Block	650	Own	Fball		Circ-Sp.		Gear	Mag		Opt	No	Grav	18K	Own
Square Turn A	1875	3	18-35	Climax	4-5 x6½	V	Pairs	850	Climax	Cent	1150	Circ		Vane	Mag	Yes	Stmbg	No	Grav	4G-30K	Bennett
Trundaar CC		3	20-35	Waukesha	4¾x6¾			900	Wauk		875	Splash			Mag	Yes	Ensign			30G	Bennett
Turner Simplicity LM		2	12-20	Waukesha	4-3¾x5¼	V	Block	1000	Wauk	Fball	550	Splash		Gear	Mag	Yes	King	Yes	Grav	5G-15K	Bennett
Turner Simplicity LMU		3	14-25	Buda	4-4¼x5½	V	Block	1000	Simplex		750	Pressure		Gear	Mag	Yes	King	Yes	Grav	5G-15K	Bennett
Twin City		3	12-20	Own	4-4¼x6	I	Block	1000	Pierce	Cent	800	Pressure		Gear	Mag	Yes	Holley	No	Grav	3G-23K	Bennett
Twin City A		4	16-30	Own	4-5 x7½	L	Block	650	Own	Cent	1700	Splash	Detroit		Mag	Yes	Holley	No	Vac	3G-33K	Bennett
Velie		3	12-24	Own	4-4½x5½	V	Block	1100	Pierce	Fball	995	Circ-Pr		Gear	Mag	Yes	King	Yes	Grav	2G-20K	Bennett
Wallis J		3	15-25	Own	4-4¼x5¾	V	Singly	900	Own	Hyd	750	Splash		Plun	Mag	Yes	Bennett	No	Grav	2G-20K	Bennett
Waterloo Boy N	1250	3	12-25	Own	2-6½x7	H		750	Own	Fball	1275	Splash-Pr		Plun	Mag	Yes	Scheb	Yes	Grav	1G-20K	Own
Whitney		2	9-18	Gile	2-5½x6½	O	Singly	750	Gile	Fball	650	Splash	M-Kipp		Mag	Yes	Bennett	No	Grav	9G	
Wisconsin E	2250	4	16-32	Climax	4-5 x6½	V	Pairs	800	Climax	Fball	1375	Pressure		Vane	Mag	Yes	Stmbg	No	Grav	6G-17K	Bennett
Yuba Ball Tread			12-20	Waukesha	4-4½x6¾	V	Pairs	700							Mag	No	Ensign	No	Grav	¼G-27K	Donaldson
Yuba Ball Tread			20-35	Wisconsin	4-5¼x7	V	Pairs	700							Mag	No	Stmbg	No	Grav	30G-8K	Donaldson
Yuba Ball Tread			10-70		4-6½x8½	V	Singly	600		Cent	3750	Circ	McCord	Gear	Mag	Yes	Stmbg	No	Grav	16G-60K	Bennett

Abbreviations

Bat—*Battery*
Cent—*Centrifugal*
Circ-*Circulating*
Circ-Pr—*Circulating Pressure*
Circ-SP—*Circulating Splash*
Cont—*Contracting*
Elec—*Electric*
Expand—*Expanding*
Fball—*Flyball*
Fric—*Friction*
Grav—*Gravity*
H—*Horizontal*
Hyd—*Hydraulic*
I—*Valve-in-Head*
Ind—*Individual*
L—*L-Head*
Mag—*Magneto*
O—*Opposed*
Plun—*Plunger*
Splash-Gr—*Splash Gravity*

oline Farm Tractors for 1919—Continued

Radiator Make	Cooling System Capacity	Cooling Fluid	Fluid Circulation	Belt Pulley Dia. Face and R.P.M.	Gearset Make	Clutch Make	Clutch Type	No. Forward Speeds	Differential Lock	Final Drive	Plowing Speed	No. Driving Wheels	Dia. and Face	No. of Tracks	Drive Wheel Axle Type	No. Non-Drive Wheels	Steering Arrangement	Frame Material	Wheelbase	Total Weight	Name and Model
Perfex...	9½	Water...	.....	12-6-700....	Own...	Own....	Fric.....	.....	No...	Gear..	2¼	2	54x 8	.....	Live...	2	Knuckle..	Channel.	90	4,000	Heider.....D
Perfex...	9½	Water....	Pump.	14-7-600....	Own...	Own....	Fric.....	.....	No...	Gear..	2¼	2	57x10	.....	Live...	2	Knuckle..	Struct...	96	6,000	Heider.....C
Perfex...	6	Water.....	Pump.	12-7-.....	Foote..	B & B..	Plate....	2	.....	Gear..	2½	2	48x12	.....	Sta....	2	Knuckle..	Struct...	83	3,850	Hession.....D
Bremer..	25	Water.....	Pump.	12-6-800....	Own...	Own....	Cone....	3	No...	Gear..	2½	2	30x 9	.....	Live...	2	.....	Steel....	Opt.	2,500	Hollis.....M
Own....	19	Water.....	Pump.	14-9-625....	Own...	Own....	Plate....	.....	.....	Gear..	.....	.....	.....	2	.....	.....	.....	Struct...	.....	13,900	Holt.....45
Own....	53	Water.....	Pump.	22-12-460...	Own...	Own....	Plate....	.....	.....	Chain.	.....	.....	.....	2	.....	1	.....	Struct...	.....	23,600	Holt.....75
Perfex...	8	Water.....	Pump.	13-7-900....	Own...	Own....	Expand..	2	No...	Gear..	2⅜	2	60x10	.....	Live...	2	Knuckle..	Struct...	91	5,000	Huber.....Light 4
Candler	10	Water.....	Pump.	24-8-412....	Own...	B & B..	Plate....	2	Yes..	Gear..	2½	2	60x12	.....	Sta....	2	Knuckle..	Struct...	92	5,500	Hudson.....K
Modine..	7	Water.....	Pump.	14-8½-600..	Foote..	Cotta...	Disk....	2	No...	Axle..	3½	2	54x10	.....	Live...	2	Knuckle..	Struct...	96	5,000	Illinois.....C
Own....	45	Water.....	Pump.	30-12-400...	.....	Own....	Shoe....	2	Yes..	Gear..	2½	2	96x30	.....	Sta....	2	Swinging.	Steel....	137	4,000	Imperial.....E
Candler	5	Water.....	Ther..	7½-6-1000..	Own...	Own....	Cont....	.....	No...	Chain.	.....	2	50x12	.....	Sta....	2	Swinging.	Struct...	.....	1,850	Indiana.....D
.....	12	Water.....	Ther..	12¼-8½-...	.....	Own....	Fric.....	.....	.....	Chain.	.....	2	40x12	2	Sta....	2	.....	.....	85	3,300	I.H.C. International....8-16
.....	39	Water.....	Ther..	20-8½-....	.....	Own....	Fric.....	.....	.....	.....	.....	2	54x10	.....	Sta....	2	.....	.....	91¼	5,525	I.H.C. Titan.....
.....	.....	Opt.....	.....	20-10½-400.	.....	.....	.....	2	.....	Chain.	2½	2	54x10	.....	.....	.....	.....	.....	90	5,500	I.H.C. Mogul.....
.....	40	Water.....	Pump.	18-9-.....	.....	Own....	Fric.....	.....	.....	.....	.....	2	66x14	.....	Live...	2	.....	.....	86¼	8,700	I.H.C. International.....
Perfex...	7	Water.....	Pump.	12-6-590....	Foote..	Cotta...	Disk....	2	No...	Gear..	3	2	60x12	.....	.....	2	.....	Struct...	99	4,400	Interstate Plowman.....
Perfex...	7	Water.....	Pump.	14-8-590....	Foote..	Cotta...	Disk....	2	No...	Gear..	3	2	60x12	.....	.....	2	.....	Struct...	99	4,800	Interstate Plowman.....
Modine..	9	Water.....	Pump.	11-7½-750..	Own...	Own....	Cont....	1	Yes..	Gear..	2½	2	56x10	.....	Live...	1	Knuckle..	Cast.....	.....	3,800	LaCrosse Happy Farmer...F
Modine..	9	Water.....	Pump.	11-7½-750..	Own...	Own....	Cont....	1	Yes..	Gear..	2½	2	56x10	.....	Live...	2	Knuckle..	Cast.....	.....	4,000	LaCrosse.....G
Perfex...	.....	Water.....	Pump.	18-8-475....	Own...	Own....	Shoe....	2	Yes..	Gear..	2½	2	54x12	.....	.....	2	Knuckle..	Pressed..	86	6,000	Lauson.....
Eureka..	8	Water.....	Pump.	14-6-.....	Own...	Own....	Shoe....	2	No...	Gear..	2¼	2	48x12	.....	Sta....	2	Knuckle..	Struct...	81	4,800	Leader.....B
Eureka..	14	Water.....	Pump.	14-8-700....	Own...	Own....	Cone....	2	No...	Chain.	1⅘	.....	.....	2	Sta....	2	Knuckle..	Struct...	94	6,400	Leader.....C
Own....	8	Water.....	Pump.	9-7-900....	Own...	Own....	Cone....	3	No...	Gear..	3	2	54x14	.....	Spring..	2	Knuckle..	Struct...	87	5,200	Little Giant.....B
Own....	10	Water.....	Pump.	13-9-750....	Own...	Own....	Cone....	3	No...	Gear..	3	2	66x20	.....	Spring..	.....	Knuckle..	Struct...	102	8,700	Little Giant.....A
Perfex...	8	Water.....	Pump.	8-8-950....	Own...	B & B..	Disk....	3	No...	Worm.	3½	2	40x10	.....	Live...	2	Knuckle..	Channel.	80	3,865	Maxim.....A
Modine..	5	Water.....	Ther..	9-6-1050...	Own...	B & B..	.....	.....	Yes..	Gear..	2⅘	2	52x 8	.....	Sta.....	.....	.....	Cast.....	.....	3,280	Moline Universal.....D
Perfex...	6	Water.....	Pump.	9-7-.....	Own...	Own....	Expand..	1	No...	Chain.	2½	.....	.....	2	.....	.....	.....	Struct...	.....	3,200	Monarch Lightfoot.....B
Perfex...	10	Water.....	Pump.	18-8-500....	Foote..	Burman.	Shoe....	2	No...	Chain.	2¼	.....	.....	2	.....	.....	.....	Struct...	.....	.....	Monarch Neverslip.....M
Perfex...	12	Water.....	Pump.	18-8-475....	Foote..	Burman.	Shoe....	2	No...	Chain.	2¼	.....	.....	2	.....	.....	.....	Struct...	.....	6,200	Monarch Neverslip.....N
Perfex...	9	Water.....	Pump.	10-6-600....	Own...	.....	.....	4	No...	Gear..	3½	2	46x10	.....	Live...	2	Knuckle..	Channel.	85	3,800	National.....E
Perfex...	10½	Water.....	Pump.	10-6-600....	Own...	.....	.....	4	No...	Gear..	3	2	46x10	.....	Live...	2	Knuckle..	Channel.	85	4,200	National.....F
Modine..	4	Water.....	Pump.	20-6-360....	Own...	Own....	Shoe....	2	No...	Chain.	2½	3	50x	.....	Live...	2	Knuckle..	Struct...	84	4,500	Nilson.....Junior
Modine..	5	Water.....	Pump.	24-8-320....	Own...	Own....	Shoe....	2	No...	Chain.	2¼	2	52x	.....	Live...	2	Knuckle..	Struct...	100	5,600	Nilson.....Senior
Perfex...	8	Water.....	.....	12-8-1000...	Own...	Own....	Disk....	3	No...	Gear..	2¾	2	60x10	.....	Sta....	2	.....	Struct...	107	5,200	Parrett.....H
Eureka..	9	Water.....	Pump.	14-7-750....	Nuttall.	B & B..	.....	2	No...	Gear..	3½	2	56x12	.....	Sta....	2	Knuckle..	Channel.	96	5,100	Peoria.....J
Perfex...	11½	Water.....	Pump.	14-8-650....	Own...	.....	.....	1	No...	Gear..	2	2	56x10	.....	Live...	2	Knuckle..	Channel.	93	5,700	Port Huron.....
Perfex...	7½	Water.....	Pump.	10-7-950....	Own...	Own....	Cone....	2	.....	Gear..	2⅝	1	48x20	.....	Sta....	2	Knuckle..	Struct...	97	3,200	Prairie Dog.....L
Modine..	7	Water.....	Pump.	12-7-875....	Own...	Burman.	Shoe....	2	Yes..	Gear..	2½	2	60x10	.....	Sta....	2	Knuckle..	Channel.	98	6,000	Reed.....
Modine..	7	Water.....	Pump.	12-7-875....	Own...	Burman.	Shoe....	2	Yes..	Gear..	2½	2	60x12	.....	Sta....	2	Knuckle..	Channel.	98	6,000	Reed.....
Perfex...	9	Water.....	Pump.	18-8-650....	Own...	.....	.....	1	No...	Chain.	2¾	2	54x14	.....	.....	2	Knuckle..	Channel.	84	4,900	Royer.....
Own....	10½	Oil.....	Pump.	18-7-560....	Own...	Own....	Shoe....	2	No...	Gear..	2⅛	2	51x12	.....	Live...	2	Knuckle..	Struct...	80½	.....	Rumely Oil Pull.....
Own....	15	Oil.....	Pump.	23-8½-530..	Own...	Own....	Shoe....	2	No...	Gear..	2⅛	2	56x18	.....	Live...	2	Knuckle..	Struct...	92½	.....	Rumely Oil Pull.....
Own....	17	Oil.....	Pump.	26-9-450....	Own...	Own....	Shoe....	2	No...	Gear..	2	2	64x20	.....	Live...	2	Knuckle..	Struct...	103	.....	Rumely Oil Pull.....
Own....	70	Oil.....	Pump.	36-11-375...	Own...	Own....	Shoe....	1	No...	Gear..	1⅞	2	80x30	.....	Live...	2	Swinging.	Struct...	141	26,000	Rumely Oil Pull.....
Own....	14	Water.....	Pump.	...8-750....	Own...	.....	.....	.....	No...	Gear..	.....	2	42x18	.....	Rigid..	1	.....	Struct...	106	5,800	Samson Sieve-Grip.....S-25
Perfex...	10	Water.....	Pump.	12-8-850....	Own...	.....	.....	1	No...	Gear..	2¼	2	60x12	.....	Sta....	1	.....	Struct...	130	7,200	Square Turn.....A
Perfex...	8	Water.....	.....	10-8-900....	Own...	B & B..	Disk....	2	No...	.....	2½	....	.....	2	.....	....	.....	Struct...	.....	9,300	Trundaar.....CC
Perfex...	8	Water.....	Pump.	14-7-600....	Foote..	Own....	Disk....	2	Yes..	Gear..	2½	2	54x10	.....	Sta....	2	Knuckle..	Struct...	87	4,000	Turner Simplicity.....LM
Perfex...	9	Water.....	Pump.	14-8-600....	Foote..	.....	Disk....	2	Yes..	Gear..	2½	2	54x12	.....	Live...	2	Knuckle..	Struct...	87	4,400	Turner Simplicity.....LMU
Spirex..	7	Water.....	Pump.	16-6-650....	Own...	B & B..	Plate....	.....	No...	Axle..	2⅕	2	50x12	.....	Live...	2	Knuckle..	Cast.....	84	4,000	Twin City.....
Modine..	20	Water.....	Pump.	17-8-528....	Own...	Own....	Cont....	.....	No...	Rim..	2	2	54x14	.....	Sta....	2	Knuckle..	Struct...	108	7,800	Twin City.....A
Bremer..	14	Water.....	Pump.	13-7¾-900..	Own...	B & B..	.....	3	Yes..	Gear..	2⅜	2	54x10	.....	Sta....	2	Knuckle..	Struct...	91	4,300	Velie.....
Modine..	8	Water.....	Pump.	18-6¾-430..	Own...	Own....	Shoe....	2	No...	Gear..	2½	2	48x12	.....	Live...	1	.....	Pressed..	100	3,250	Wallis.....J
Modine..	.....	Water.....	Pump.	14-8-.....	Own...	Own....	Cont....	2	No...	Gear..	2¼	2	52x12	.....	Live...	2	Swinging.	Struct...	89	5,860	Waterloo Boy.....N
Modine..	.....	Water.....	Pump.	11-6¾-750..	Own...	Own....	Band...	3	No...	Chain.	2½	2	48x10	.....	Live...	2	Knuckle..	Channel.	82	2,850	Whitney.....
Perfex...	12	Water.....	Pump.	16-8-575....	Foote..	B & B..	Disk....	2	No...	Gear..	2⅛	2	52x12	.....	Live...	2	Knuckle..	Channel.	95	5,400	Wisconsin.....E
Own....	6½	Water.....	Pump.	12-6¾-700..	Own...	B & B..	Disk....	3	No...	Gear..	2⅛	.....	.....	2	.....	1	.....	Channel.	90	6,750	Yuba Ball Tread.....
Own....	15	Water.....	Pump.	...8½-700..	Own...	Paragon.	Disk....	2	No...	Gear..	2⅛	.....	.....	2	.....	1	.....	Channel.	108	10,250	Yuba Ball Tread.....
Own....	22	Water.....	Pump.	18-10½-600.	Own...	.....	Expand..	3	No...	Gear..	2⅛	.....	.....	2	.....	1	.....	Channel.	120	21,000	Yuba Ball Tread.....

Splash-Pr—*Splash Pressure*
Sta—*Stationary*
Struct—*Structural Steel*
T—*T-Head*
Throt—*Throttle*
V—*Vertical*

Vac—*Vacuum*

Equipment

B & B—*Borg & Beck*
Cont—*Continental*

Hersh-Sp—*Herschell-Spillman*
King—*Kingston*
M-Kipp—*Madison Kipp*
Pick—*Pickering*
Rayfld—*Rayfield*

Scheb—*Schebler*
S.H.J.—*Shotwell-Hobart-Johnson*
Sparks—*Sparks-Withington*
Stmbg—*Stromberg*
Wauk—*Waukesha*

40 Years of Domestic Metal Production

Steady Increases Are Shown Throughout the Years and There Is Evidence of the Strenuous Effort Made to Increase Production to Meet the Demands of War

UNDER normal commercial conditions the state of the metal market has, quite naturally, interested the manufacturer of automotive products both in a general way and also more particularly in regard to those metals which are essentials to the carrying on of his business. In past years the various branches of our industry have been dependent on the prices set for steel, aluminum, copper and other metals for the fixing of their respective selling prices for the product with which they have been individually identified, or, at least, the basic prices of these metals exercised an influence on those of the complete car, truck, tractor, etc.

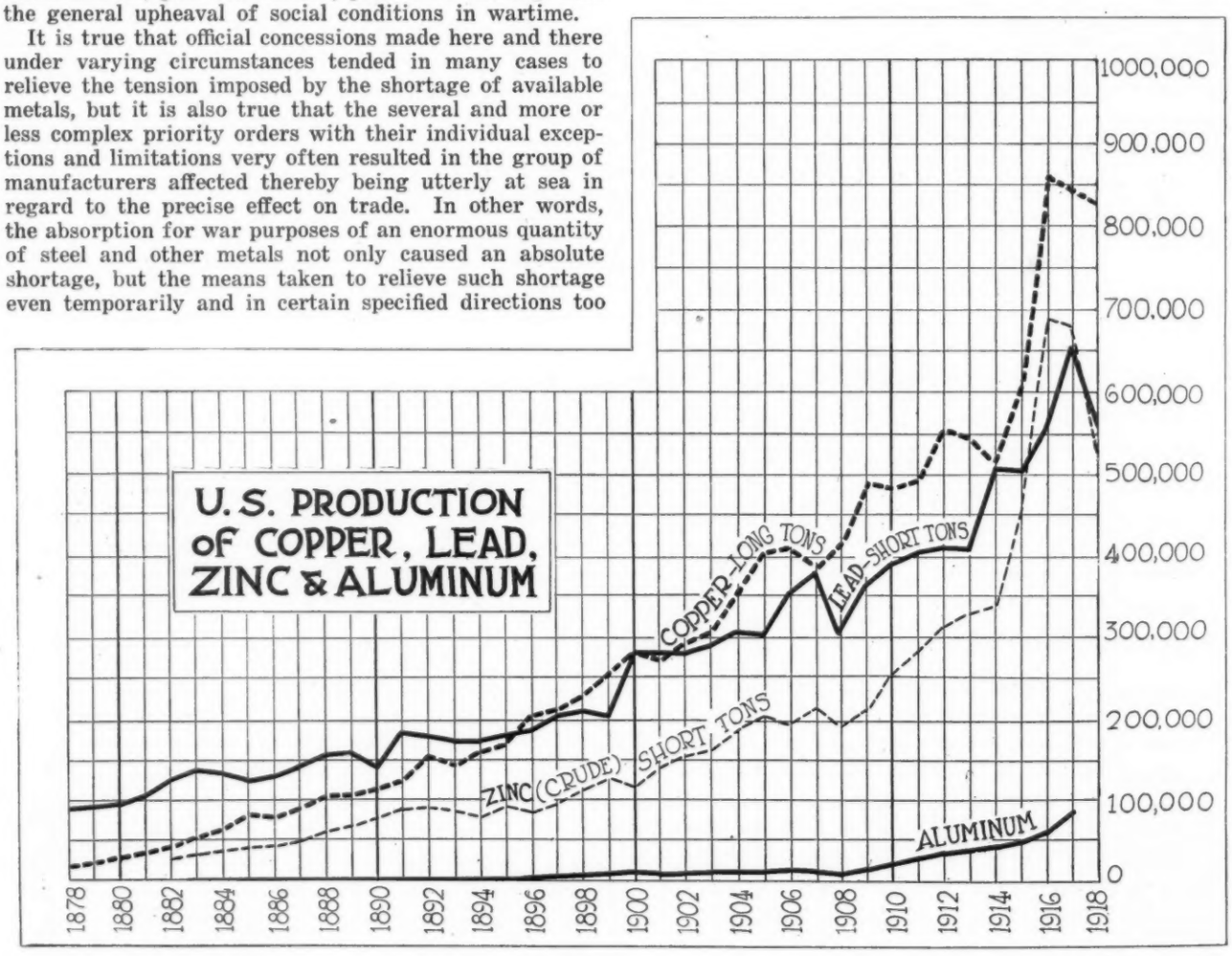
That conditions were abnormal in the highest degree during the past year is an axiom—the truth of the statement is so apparent that no proof or demonstration is needed—and obviously the automotive industry has been practically dominated by the existing position of the metal market, plus restrictions, plus labor shortage and the general upheaval of social conditions in wartime.

It is true that official concessions made here and there under varying circumstances tended in many cases to relieve the tension imposed by the shortage of available metals, but it is also true that the several and more or less complex priority orders with their individual exceptions and limitations very often resulted in the group of manufacturers affected thereby being utterly at sea in regard to the precise effect on trade. In other words, the absorption for war purposes of an enormous quantity of steel and other metals not only caused an absolute shortage, but the means taken to relieve such shortage even temporarily and in certain specified directions too often caused additional troubles and misunderstandings.

That this should be the case is not to be wondered at, for human nature has not changed since Æsop demonstrated it was impossible to please everybody, and, with the best possible intentions, the official allocation of certain metals to specified sections of various industries sometimes brought results which were not pleasing to others.

However, restrictions have been removed, production generally is speeding up, and already there are indications that things will be a bit easier for the automotive products manufacturer in the near future.

We are still faced with problems regarding steel, primarily, and other metals to a lesser degree, but, doubtless, these will be solved speedily. For instance, it is possible that several million tons of steel will be needed to assist in the restoration of devastated France and



Belgium. It is not known how much may be required, but it will be a quantity large enough to make serious demands on our present estimated production of 45,000,000 tons a year.

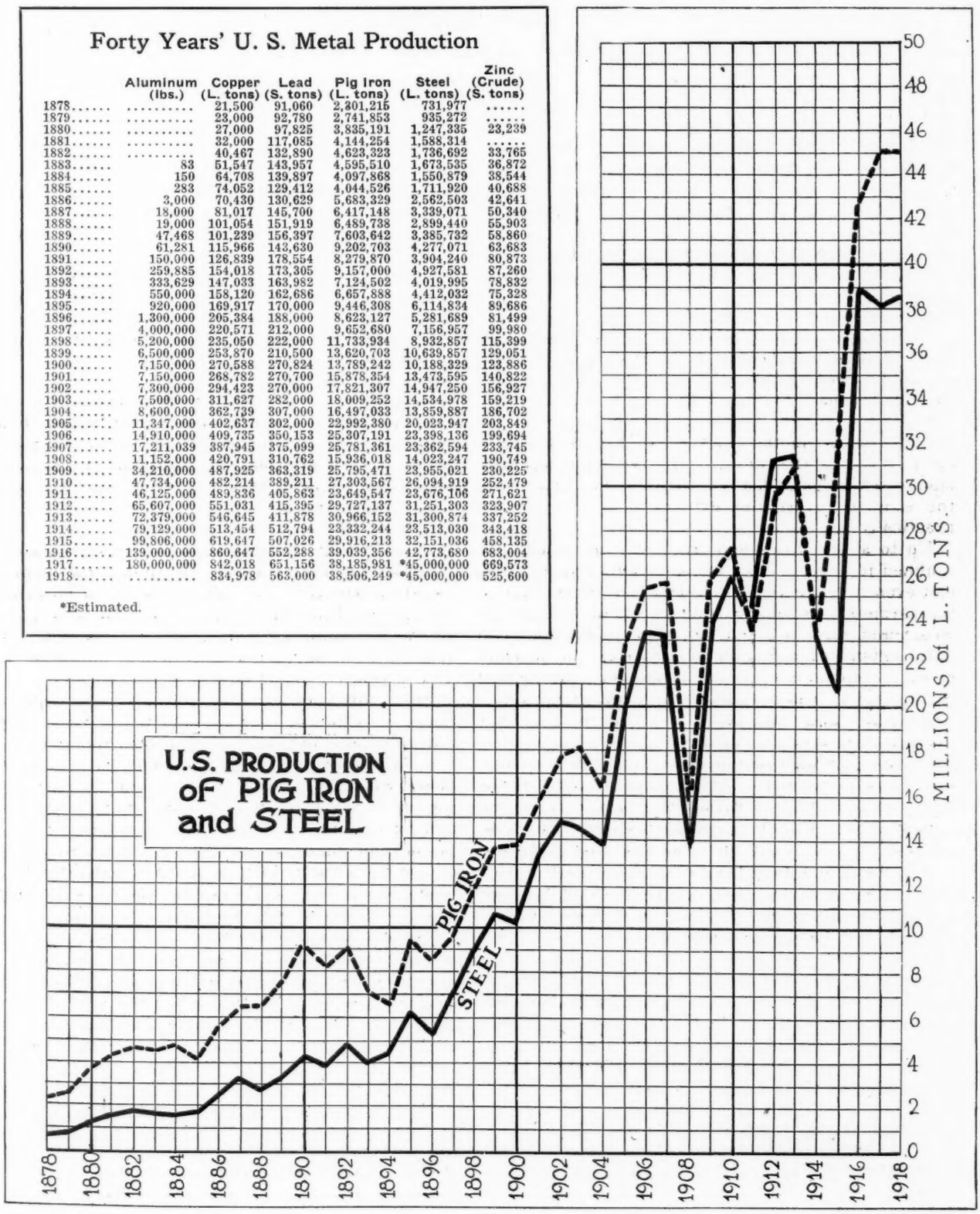
The table and charts herewith are self-explanatory, but in regard to them it should be mentioned that the pressure of wartime business has seriously interfered with the official compilation of production figures for 1917 and 1918. For this reason a few of the items are represented by estimated totals. All figures refer to domestic production only.

The tremendous growth in the use of the comparatively new metal, aluminum, is shown in the table. In 1883 the production was but 83 lb., in 1917 it was 180,000,000 lb., and, although figures for 1918 have not yet been compiled, there is but little doubt that the total is even larger.

Forty Years' U. S. Metal Production

	Aluminum (lbs.)	Copper (L. tons)	Lead (S. tons)	Pig Iron (L. tons)	Steel (L. tons)	Zinc (Crude) (S. tons)
1878.....	.....	21,500	91,060	2,301,215	731,977	.....
1879.....	.....	23,000	92,780	2,741,853	935,272	.....
1880.....	.....	27,000	97,825	3,835,191	1,247,335	23,239
1881.....	.....	32,000	117,085	4,144,254	1,588,314	.....
1882.....	.....	40,467	132,890	4,623,323	1,736,692	33,765
1883.....	83	51,547	143,957	4,595,510	1,673,535	36,872
1884.....	150	64,708	139,897	4,097,868	1,550,879	38,544
1885.....	283	74,052	129,412	4,044,526	1,711,920	40,688
1886.....	3,000	70,430	130,629	5,683,329	2,562,503	42,641
1887.....	18,000	81,017	145,700	6,417,148	3,339,071	50,340
1888.....	19,000	101,054	151,919	6,489,738	2,899,440	55,903
1889.....	47,468	101,239	156,397	7,603,642	3,385,732	58,860
1890.....	61,281	115,966	143,630	9,202,703	4,277,071	63,683
1891.....	150,000	126,839	178,554	8,279,870	3,904,240	80,873
1892.....	259,885	154,018	173,305	9,157,000	4,927,581	87,260
1893.....	333,629	147,033	163,982	7,124,502	4,019,995	78,832
1894.....	550,000	158,120	162,686	6,657,888	4,412,032	75,328
1895.....	920,000	169,917	170,000	9,446,308	6,114,834	89,686
1896.....	1,300,000	205,384	188,000	8,623,127	5,281,689	81,499
1897.....	4,000,000	220,571	212,000	9,652,680	7,156,957	99,980
1898.....	5,200,000	235,050	222,000	11,733,934	8,932,857	115,399
1899.....	6,500,000	253,870	210,500	13,620,703	10,639,857	129,051
1900.....	7,150,000	270,588	270,824	13,789,242	10,188,329	123,886
1901.....	7,150,000	268,782	270,700	15,878,354	13,473,595	140,822
1902.....	7,300,000	294,423	270,000	17,821,307	14,947,250	156,927
1903.....	7,500,000	311,627	282,000	18,009,252	14,534,978	159,219
1904.....	8,600,000	362,739	307,000	16,497,033	13,859,887	186,702
1905.....	11,347,000	402,637	302,000	22,992,380	20,023,947	203,849
1906.....	14,910,000	409,735	350,153	25,307,191	23,398,136	199,694
1907.....	17,211,039	387,945	375,099	25,781,361	23,362,594	233,745
1908.....	11,152,000	420,791	310,762	15,936,018	14,023,247	190,749
1909.....	34,210,000	487,925	363,319	25,795,471	23,955,021	230,225
1910.....	47,734,000	482,214	389,211	27,303,567	26,094,919	252,479
1911.....	46,125,000	489,836	405,863	23,649,547	23,676,106	271,621
1912.....	65,607,000	551,031	415,395	29,727,137	31,251,303	323,907
1913.....	72,379,000	546,645	411,878	30,966,152	31,300,874	337,252
1914.....	79,129,000	513,454	512,794	23,332,244	23,513,030	343,418
1915.....	99,806,000	619,647	507,026	29,916,213	32,151,036	458,135
1916.....	139,000,000	860,647	552,288	39,039,356	42,773,680	683,004
1917.....	180,000,000	842,018	651,156	38,185,981	*45,000,000	669,573
1918.....	.....	834,978	563,000	38,506,249	*45,000,000	525,600

*Estimated.



Small Tractor Increases Potential Market From 2% to 60% of Farms

Development of Compact, Easily Managed Machines Extends Field From 15 to 48 States—Market Greater Than Production Capacity

THE last 2 years have seen an entire change in the condition confronting the farm tractor industry. Up to 1916 the number of farm tractors in use represented approximately one-third of 1 per cent of the total number of farms in the United States, and farm tractor use was confined to the great wheat and corn belt. In many of the eastern states very few farm tractors had been sold and the horse-drawn implements were used on practically all farms.

At the close of 1917 the number of tractors in use has increased to a little over one-half of 1 per cent of the number of farms and at the close of 1918 the number had increased to something over 1 per cent.

The increase in the tractor use had come almost entirely from the advent of the small compact tractor which extended the scope of the tractor into the smaller farms and extended its market into practically all states.

Up to a few years ago tractors were practically confined in their use to farms of 500 acres or over, and even in these farms a very small percentage of the farmers were using tractors at all. From the wheat and corn belt and the large farm interested in the extensive cultivation of subserials the developments in tractor design and production has carried the tractor at least to some extent into most of the other states and into farms of a general character down to as low as 50 acres.

It has made extensive markets in the states which previously had no use for tractors at all. It has not only extended the possibilities of the use of the tractor over small areas for cultivation but has made available for belt work in connection with the other power machinery possibilities on the smaller farms so that its economic value is increased and it can earn its way on farms restricted in size and devoted to general crops where the tractor of 3 or 4 years ago could not be economically used.

In New York State, which was not considered as a tractor market before this newer development, there has been a large sale of tractors in the last 2 years, and particularly in the last year, and they have been successfully used on farms as small as 50 acres. Some of the dealers in this state have sold as high as sixty tractor in their section.

The two conditions which have governed the development of the tractor in this way have been the world-wide demand for American food products, developed by the war, and a shortage of labor on the farm.

This shortage of labor is just as acute on the small farm as it is on the large farms in the wheat and corn belts, in fact in some respects it is more acute because of the difficulty in securing help of the character which must be available for the many duties devolving on the man on the smaller farm where jobs cannot be specialized.

In addition to this the farmer who is operating the smaller farm meets with the growing dislike of the laborer with the heavy physical work which is necessary in cultivating with horse-drawn implements, and in operating the hand machinery required in the other jobs.

The advent of the small tractor has automatically increased the potential market from approximately 2 per cent of the farms in the United States to a little over 60 per cent of the farms in the United States and it has automatically extended the market from approximately fifteen states to the forty-eight states of the Union.

It is evident that the demand for American food products is to continue with almost the same imperative necessity for some time to come although actual hostilities have ceased, because a large part of the European farm areas will still require a great deal of re-construction in order to put them back to a pre-war production.

It is also apparent that the labor shortage is to continue although perhaps not to the same degree. There is no evidence of any surplus of labor in the United States and when the readjustment is over there will still be a shortage which is usually felt on the farms more than in any other direction.

Under these conditions it is obvious that the actual immediate market for farm tractors is much larger than the present productive capacity and the potential market is at least as big as the developed market for passenger cars which has come out of the 20 years work in this field.

The development of the small tractor with its extended possibilities of service, less expensive to buy and maintain, with greater opportunities to become economically useful under the varied conditions of farming in this country, have increased the market not only by extending it over states which were not tractor users previously, but by increasing the possibilities enormously even in the states which previously used a good many of the tractors then produced. In Nebraska for instance a number of farms of 500 acres and over represents 11 per cent of the total while the number of farms of 100 to 500 acres represents 70 per cent of the total.

NUMBER OF FARMS OF VARIOUS ACREAGES IN ALL STATES

STATE	Under 20 Acres	20 to 49 Acres	50 to 99 Acres	100 to 174 Acres	175 to 499 Acres	500 to 999 Acres	1,000 Acres and Over	TOTAL
NEW ENGLAND								
Maine	7,113	9,492	17,895	16,633	8,293	461	129	60,016
New Hampshire	4,595	4,509	6,248	6,247	4,774	513	167	27,053
Vermont	4,578	3,481	5,910	9,492	8,516	607	125	32,709
Massachusetts	10,606	8,890	7,981	5,703	3,325	319	93	36,917
Rhode Island	1,377	1,144	1,264	945	487	51	24	5,292
Connecticut	6,035	6,306	6,634	4,999	2,613	188	40	26,815
Total	34,304	33,822	45,932	44,019	28,008	2,139	578	188,802
MIDDLE ATLANTIC								
New York	34,188	31,047	56,821	61,031	31,163	1,104	243	215,597
New Jersey	8,073	7,607	8,194	7,207	2,235	112	59	33,487
Pennsylvania	38,658	39,721	65,687	55,518	18,912	632	167	219,295
Total	80,919	78,375	130,702	123,756	52,310	1,848	469	468,379
EAST NORTH CENTRAL								
Ohio	38,913	50,331	88,047	68,746	25,113	783	112	272,045
Indiana	23,644	40,161	67,221	57,261	26,107	949	142	215,485
Illinois	20,294	33,322	57,917	80,539	57,755	1,842	203	251,872
Michigan	14,785	49,890	73,748	50,622	17,143	607	165	206,960
Wisconsin	10,647	23,460	54,007	58,439	29,467	966	141	177,127
Total	108,283	197,164	340,940	315,607	155,585	5,147	763	1,123,489
WEST NORTH CENTRAL								
Minnesota	5,619	12,028	26,571	55,424	52,836	3,359	300	156,137
Iowa	13,724	15,678	38,712	80,121	66,165	2,430	214	217,044
Missouri	19,756	47,398	74,178	80,020	51,921	3,427	544	277,244
North Dakota	229	450	1,207	23,003	34,393	12,662	2,416	74,360
South Dakota	808	1,121	2,406	28,396	33,041	9,698	2,174	74,644
Nebraska	4,358	4,558	12,618	43,916	47,233	13,128	3,867	129,678
Kansas	8,042	10,738	26,151	57,789	61,286	10,475	3,360	177,841
Total	52,536	91,971	181,843	368,669	346,875	55,179	12,875	1,109,948
SOUTH ATLANTIC								
Delaware	1,535	1,988	2,977	2,849	1,429	52	6	10,836
Maryland	10,232	8,629	9,946	11,457	8,070	506	83	48,923
Dist. of Columbia	122	65	17	10	3	.....	.....	217
Virginia	39,746	42,390	38,342	32,997	26,101	3,450	992	184,018
West Virginia	15,399	20,323	26,806	20,156	12,248	1,316	437	96,685
North Carolina	43,224	75,629	62,157	43,987	25,254	2,669	805	253,725
South Carolina	37,985	70,582	33,147	19,427	12,539	1,942	812	176,434
Georgia	29,629	117,432	68,510	42,275	27,710	3,950	1,521	291,027
Florida	9,084	17,169	9,999	8,178	4,545	670	371	50,016
Total	186,956	354,207	251,901	181,336	117,899	14,555	5,027	1,111,881
EAST SOUTH CENTRAL								
Kentucky	55,472	58,537	65,778	50,134	26,639	2,181	444	259,185
Tennessee	47,341	72,212	60,105	41,545	22,450	1,878	481	246,012
Alabama	41,858	106,841	55,448	35,563	20,093	2,276	822	262,901
Mississippi	66,943	112,666	44,645	30,172	17,115	2,061	780	274,382
Total	211,614	350,256	225,976	157,414	86,297	8,396	2,527	1,042,480
WEST SOUTH CENTRAL								
Arkansas	36,259	74,983	45,373	39,353	17,149	1,163	398	214,678
Louisiana	29,256	46,389	20,248	13,681	8,406	1,548	1,018	120,546
Oklahoma	7,158	31,489	39,002	75,186	33,812	2,688	857	190,192
Texas	29,371	98,583	112,237	94,574	59,049	12,833	11,123	417,770
Total	102,044	251,444	216,860	222,794	118,416	18,232	13,396	943,186
MOUNTAIN								
Montana	755	956	1,260	10,552	8,339	2,353	1,999	26,214
Idaho	2,005	4,048	5,820	11,891	5,866	921	256	30,807
Wyoming	420	338	645	3,816	3,629	984	1,155	10,987
Colorado	5,070	3,882	4,384	16,355	12,476	2,426	1,577	46,170
New Mexico	6,885	2,812	1,820	15,363	7,388	836	572	35,676
Arizona	3,346	1,477	820	2,591	757	164	72	9,227
Utah	4,674	5,550	4,170	3,660	2,681	551	390	21,676
Nevada	271	320	411	555	540	248	344	2,689
Total	23,426	19,383	19,330	64,783	41,676	8,483	6,365	183,446
PACIFIC								
Washington	10,529	10,252	7,105	13,884	9,215	3,481	1,726	56,192
Oregon	6,030	6,888	6,800	12,009	9,343	2,716	1,716	45,502
California	22,525	20,614	10,680	12,015	12,551	5,119	4,693	88,197
Total	39,084	37,754	24,585	37,908	31,109	11,316	8,135	189,891
Grand total	839,166	1,414,376	1,438,069	1,516,286	978,175	125,295	50,135	6,361,502

AUTOMOTIVE INDUSTRIES
The Automobile

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Horace M. Swetland, President
W. I. Ralph, Vice-President E. M. Corey, Treasurer
A. B. Swetland, General Manager
U. P. C. Building, 231-241 West 39th Street, New York City

BUSINESS DEPARTMENT
Harry Tipper, Manager

EDITORIAL
David Beecroft, Directing Editor
P. M. Heldt Sydney Oxberry
DETROIT OFFICE WASHINGTON OFFICE
J. Edward Schipper Allen Sinsheimer

BRANCH OFFICES
Chicago—Mallers Bldg., 59 East Madison St., Phone Randolph 6960
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Car Registrations

THE most remarkable fact that may be gathered from the tables of car registrations, printed elsewhere in this issue, is that the greatest "density of automobiles" on the basis of population is to be found in the Middle-Western farming states. Iowa and Nebraska lead, closely followed by South Dakota —all adjacent states. In Iowa and Nebraska there is now one car to every seven of the population. It would not be quite correct to say that every second family there has its car, as in these states the people do not live in apartment houses and the families average larger than those of the big cities. In the cities of these states there must be many families which for one reason or another do not own a car, and the figures indicate that practically every farmer there now has his machine.

There could hardly be a more conclusive argument to show the utilitarian character of the automobile than that furnished by these figures. The farmer uses his car mainly for driving to town. While he may occasionally make the trip purely for pleasure, as a rule it is business of one kind or another that compels him to make it. With the increasing amount of machinery of all kinds in use on the farm it becomes necessary to drive to town more frequently. The whole method of conducting farm business has been changed by the advent of the automobile. Discussing the "gasless Sunday" rule of last fall and the possibility of still greater restrictions on the supply of gasoline, which might also be extended to that part of the country west of the Mississippi, an Iowa dairy farmer said that without the use of his car he simply could not continue his business.

Another interesting feature in connection with the registration figures is the rather irregular rate of increase. If we make an exception of New Jersey, the states at the head of the list showing the rate of increase are all Southern states. There are several reasons to explain this fact. Most of the Southern states have as yet only a comparatively small number of cars, so that a large proportional increase does not mean a very large absolute increase in the number of cars. New Jersey stands rather alone among the states with a high proportional increase, far from her neighbor states of New York and Pennsylvania. She has made up the former lead of these states in respect to "density of automobiles" and now is on a substantially equal footing with them.

It is only natural that the proportional annual increase in automobile registrations should gradually decrease, and the figure of 20 per cent for the whole country for the year 1918 is remarkably good, considering the circumstances. The full effect of the war's interference with automobile production will probably appear only next year.

Tests of Piston Rings

IT is a great pity that there is not some quick and reliable method for making comparative tests of piston rings. A large amount of ingenuity has been spent in recent years in attempts to improve this rather unimportant looking part of the engine. The claims made for the different special rings are all very much the same and there is no readily available method of checking them up.

How important any slight improvement is from the standpoint of fuel economy may be judged from a recent estimate placing the number of piston rings annually produced in the United States at 200,000,000. This figure may be slightly too high, but when it is considered that one automobile factory alone uses 16,000,000 rings per year it will be seen that it cannot be so very far off.

The two aims of practically all inventors of piston rings are uniform pressure all around the ring and elimination of the leakage path at the cut or joint. Formerly it was customary to obtain the necessary "spring" by making the ring to a larger diameter than the cylinder bore and compressing it after material had been removed at the gap, but lately there has been a tendency to produce the "spring" by hammering or peening, the ring being machined

to the diameter of the bore and then expanded. The advantage claimed is that in this way the pressure can be made more nearly uniform all around the ring.

Another change in the methods of ring manufacture has been the substitution of individually cast rings for cast-iron pots from which about a dozen rings are cut. From the individually cast rings very little material is removed in machining, and it is claimed that the chilled skin of the casting is more elastic or more springy than the core material. But the chilling also increases the hardness and therefore the wear of the cylinder walls by the rings. Recently the suggestion has been made to cast the ring blanks in a centrifugal machine so as to compact the iron while it is solidifying.

The automobile engineer whose duty it is to choose rings for an engine must often be in doubt as to the validity of the claims made for different designs. No generally accepted test for ring efficiency exists. Not even the pressure at different parts of the ring circumference can be accurately measured. Dynamometer tests, of course, will give some idea of the efficiency of the ring, but the difficulty is that when one set of rings is to be substituted for another for the purpose of a comparative test the engine must be dismounted and it is practically impossible to exactly reproduce all the conditions of the test.

Returned Soldiers

THERE is a tendency in some quarters to exaggerate the condition of the returned soldier. It is stated that he is not being given a fair chance to secure a job and that in many instances he is being turned loose without any opportunity of making a living and with a good chance of his money running short before he can get suitable employment.

It would not be correct to say that no such condition exists, because there are no doubt many instances where the soldier would like to get work and for a combination of reasons may not be able to get it. Taking the situation generally, however, as it applies to the Mid-West manufacturing districts centering about Detroit, the condition does not apply.

As a matter of fact there is a reluctance on the part of the soldier to return to the job he left. He is looking for something better, and in many cases camp life has put him in a frame of mind making him long for a rest more than for a job. At the Detroit government employment bureau soldiers come in now and then asking what are the chances of a job in a week or two.

A large majority of the factories and industrial concerns which are able to turn to peace-time pursuits are taking back the men who were drafted or who enlisted, and in practically every case the returned soldier is given the first chance for the job, if his qualifications are anywhere near those considered necessary.

In the smaller towns the problem of the returned soldier does not exist. It is those who have been attracted by the lure of the metropolis and decided to seek employment in the big city, which they perhaps had never seen until the war took them there, who constitute a problem. The farm and factory can absorb the returned soldier readily, the big city cannot do so equally well. The soldier who is brought home to the place where he enlisted or from which he was drafted is not going to prove a dangerous factor in the employment situation.

Air Mail Service

CAN we take our long-distance air mail service seriously? Recent map-making and experimental trips have revealed difficulties and irregularities that do not give any great amount of hope that long-distance air mail service is going to prove a success with the present type of planes. It would be folly, indeed, to go to any great expense until experiments on a small scale have shown exactly what can be expected.

The principal fact which has been learned from experience to date is that it is unwise to fly in stages of over 250 miles. If longer trips are to be made they should be done in relays. Another fact which is becoming apparent is that the Liberty engine, although a great war engine, is not the most satisfactory one for mail-carrying service. The fuel consumption of this engine ranges all the way from 26 to 32 gal. per hour, according to records of the flight fields, and this, of course, is not economical from a weight-carrying standpoint alone.

It must also be taken into consideration that an engine of this size and power requires frequent overhauling, and that after 50 hr. of flight there exists an uncertainty as to how much longer the engine will run without failure. It is a fact that Liberty engines have flown from 125 hr. and upward, yet it is the average that must be considered rather than the exceptional.

If the mail service is going to be materially benefited by the introduction of the airplane post on a large scale, it should be entered whole-heartedly, but a close study should be made of the type of engine and plane best adapted to the work. There is no doubt that we have a large store of Liberty engines on hand, and also a large store of the De Haviland type planes, but if these are not the most efficient type, before we get into the matter on a large scale it would seem wise to have worked out the best type of plane for the purpose and also to have carefully determined the length of the desirable stage. The pilots who recently flew from Texas to Detroit demonstrated the futility of the long-distance service under present conditions.

AT the coming S. A. E. meeting in New York much attention will be paid to the subject of fuels. In view of the present precarious fuel situation and the fact that the future of the automotive industry is absolutely dependent upon a rapid increase in the available fuel supply, the papers committee has certainly shown good judgment in making this the leading topic.

□ Latest News of the

2000 to Attend S.A.E. Victory Dinner

Society's Chicago Meeting to Discuss Engines of Various Types—New York Has Big Program

NEW YORK, Jan. 15—More than 600 tickets already have been sold for the Victory Dinner of the Society of Automotive Engineers, which is to be held at the Hotel Astor on Feb. 6. It is confidently expected that the number of members and guests in attendance will touch and probably top the 2000 mark.

Plans for the Chicago meeting of the S. A. E., which will be held during the week of the passenger car show, have progressed to the point where a tentative program has been adopted. The meeting will be held in the afternoon of Jan. 30, and the program will comprise a number of short papers on truck, tractor and passenger car engines, with a discussion of the possibilities of air-cooled engines, as well as of steam engines. The evening session is to be preceded by a "Home-Coming" supper.

For the New York session the program has been considerably amplified, and as now arranged will include a report by Dr. David White, chief geologist of the United States Geological Survey, on the unmined supply of petroleum in the United States. This will supplement papers by Dr. E. W. Dean, of the Bureau of Mines, on the status of refinery practice, with particular reference to cracking methods; Dr. J. E. Pogue, who will give an interpretation of the engine fuel problem; Dr. H. C. Dickinson, of the Bureau of Standards, who will present a paper on the status of engine efficiency, and E. De Golger, who will give an estimate of the expense of the utilization of Mexican crudes. John J. Utz will give some historical notes on military truck standardization, and Major A. B. Browne is scheduled to outline some lessons in truck design developed in the war. George F. Crouch will present a paper on the application of the marine internal combustion engine to war needs. An entertaining and illuminating presentation on forest products for aircraft use will be made by Clyde H. Teesdale. Lieut. Alexander Klemin and Grover C. Loening will treat of proportioning planes to engines and of high-speed planes respectively.

The Navy Department will co-operate very generously in the program, Commanders H. C. Richardson and F. G. Coburn speaking on airplane and seaplane engineering and production. Starr Truscott will have dirigibles as a subject. It is hoped that Commander J. H. Towers will tell of the operation of naval aircraft.

—

Elgin in Good Financial Condition

CHICAGO, Jan. 15.—About 1000 were present at the annual stockholders' meeting of the Elgin Motor Car Corp. yesterday. The old board of directors was re-elected, with the exception of A. L. Tull, who resigned. His place was taken by William McMasters, industrial agent of the Indiana Harbor Belt Railway Co. The following directors were re-elected: C. S. Rieman, Gregory L. Baum, W. G. Knoedler, J. M. Smitheler and David Schnitzer. The meeting was a harmonious one throughout and the stockholders passed a resolution of thanks to the management for the satisfactory manner in which the company had been brought through the difficult war period.

—

England Plans World-Wide Airplane Service

LONDON, ENGLAND, Jan. 13—By Mail—England is laying plans to conquer the airways of the world, according to an exhaustive report which has just been made by the Civil Aerial Transport Committee, which was appointed especially to study future legislation both in the British Empire and among the Allied nations. The report urges that all the Dominion be encouraged to build up large air fleets for aerial mail and passenger transportation. None of the sixty members of the committee expressed any doubt that within a few years passenger lines would be running to all parts of the world. It is pointed out that state ownership of aerodromes and landing stations is necessary in the interest of national defense and highly desirable also for commercial purposes. In that part of the report dealing with the choice of air routes the committee suggests that New York be the Western terminus of the Atlantic route, and points to the advisability of designing and arranging for the establishment of sea stations in the form of ships approximately 600 ft. long with a clear upper deck of 400 ft. This would permit the use of airplanes instead of seaplanes. In an appendix the opinion is advanced that planes capable of flying 500 miles without alighting will fill all requirements.

—

$280 Reduction for G. M. C. ¾-Ton Truck

PONTIAC, Jan. 16—The General Motors Truck Co. has lowered the price of its ¾-ton truck, model 16, from $1775 to $1495, a reduction of $280.

Trade-Mark "Ford" More Than Name

Far Reaching Decision Gives Additional Protection Against Infringement

DETROIT, Jan. 13—"I am satisfied that the word 'Ford' is not merely the name of Henry Ford, or merely the name of any other man, it is the name of a machine."

This sentence is taken from the decision of Assistant Patent Commissioner F. W. H. Clay in an opinion reversing the decision of the trade-mark examiner in refusing to register the Ford Co. trade-mark as the business slogan for a new line of rubber goods which Ford proposes to market.

The decision is far-reaching. It not only gives manufacturers of all well known products additional protection against trade-mark infringement but it establishes a precedent by sustaining the contention that the Patent Office stand that names are not good trade-marks, does not hold true in all cases. While it does not bar men of similar surnames from doing business under the same, it prohibits them from using their own name as a trade-mark for their product if the goods they market represent articles similar to the output of another firm having established a reputation and marketing its output under the same trade-mark.

It is a final blow to the efforts of certain concerns to market automobile parts and accessories under the names of well-known companies. The Ford Motor Co., has not only had several cases of this nature to deal with, but a number other companies have also been obliged to combat like attempts to infringe upon their names.

In his ruling the Patent Commissioner says there is some force in the applicant's argument that when an automobile has become as well known as the Ford, it is the natural expansion of the regular business to make automobile tires and to extend the trade-mark to them on the basis of the rights acquired by the usage of the automobile itself. He declares it is his conviction that the Ford mark is a good mark at common law and is the exclusive property of the Ford Co., using the name as its trade-mark.

The commissioner holds that for a great many years the public has had a very wide familiarity with this exact form of this word as a mark on an automobile and parts of automobiles. He declares one cannot be justly ignorant of

(*Continued on page* 192)

Automotive Industries

Manufacturers Band Together

Organize to Facilitate Speedy Adjustment of Canceled Orders—Will Post Others

DETROIT, Jan. 13—Detroit manufacturers of war materials, who have millions of dollars tied up in supplies purchased to fill nearly $300,000,000 outstanding war contracts, all of which have been canceled since the signing of the armistice, have organized to facilitate a more speedy adjustment of those contracts still unsettled.

Leading manufacturers of Detroit and other cities in Michigan met here Friday, Jan. 10, and organized a local section of the National Association of Manufacturers of War Material. The duties of the Detroit branch will be to furnish manufacturers with information emanating from the Washington headquarters as to methods of filing claims and to communicate to members the situation with regard to federal action in adjustment matters.

Because of the money tie-up, a number of plants, especially the smaller ones, are in bad financial shape, it is said. One of the largest companies, however, has $4,000,000 invested in war materials practically useless for any other kind of work. Although the board of claims of the Detroit district department, organized for the purpose of compensating manufacturers for losses due to the abrupt termination of contracts, has been ready for work since early in December, only 24 claims have been presented. Three were approved and two withdrawn.

Delay is due to the vast amount of detail work necessary before the contractor can present his claim. All plants handling ordnance work in the district have either been instructed to suspend work or given a definite time by which contracts must be completed. Up to the present time industrial plants have accepted suspension orders on 260 contracts.

—

Five Per Cent Tax Retained in War Revenue Bill

NEW YORK, Jan. 15—The Conference Committee of the Senate and House of Representatives, which is considering the new war revenue bill, has retained in it a 5 per cent tax on the sale price of passenger cars, tires, inner tubes, parts and accessories. Previously the committee had eliminated the proposed 5 per cent tax on the sale price of motor trucks, but manufacturers are not altogether sanguine that the tax has been permanently eliminated. When the matter was voted on a number of members of the committee voted against the elimination of the tax, and it is for this reason that some fear is expressed that it may be put back in the bill. It is regarded as practically certain now that the 5 per cent on cars, tires, tubes and parts will be left in the bill. It seems likely that there will be no floor tax.

—

Farm Equipment Prices Will Be Maintained

KANSAS CITY, Jan. 14 — Present prices of farm equipment will be maintained at the same level for an indefinite period, according to G. A. Ranney, of the International Harvester Co., and president of the National Implement and Vehicle Association. The assurances that prices would not be reduced or advanced in the immediate future was given at the meeting of the opening session at the convention of Western Implement, Vehicle and Hardware Dealers to-day. There were more than 500 dealers present at the first session.

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Military Airplanes at New York Aeronautical Show

NEW YORK, Jan. 15—It is likely that the forthcoming aeronautical exposition, which is to be staged in Madison Square Garden, Feb. 27 to March 6, by the Manufacturers Aircraft Association, will house a number of military exhibits, including many types of American and allied machines as well as a number of enemy trophies. The exposition is assured of the co-operation of both the naval and military air services.

—

Metz to Make a Six

WALTHAM, MASS., Jan. 13—The Metz Co., which during the war virtually suspended the production of passenger cars to devote its entire facilities to the manufacture of products for the government, is shortly to place on the market a new six-cylinder model which will sell for $1,495. The friction transmission which has long been a feature of Metz cars has been discarded in favor of a three-speed selective gearset. The engine is rated as 45 h.p. and the principal units of the car include a semi-floating axle, semi-elliptic springs with Hotchkiss drive and an electric lighting and starting system. The wheelbase will be 117 in. and tires 32 x 4.

—

Cleveland Plant for Sparton Radiators

CLEVELAND, Jan. 15—The Sparks-Withington Co. will establish a plant here for the production of Sparton radiators. It will be operated by a local company.

Labor Situation in Detroit

Position Much Better Than Generally Believed—Surplus of Workers Will Be Absorbed Speedily

DETROIT, Jan. 13—The labor situation here seems to have originated many rumors. As a matter of fact it is not half so bad as is generally believed, and it would appear that politics is playing an important part in the issue. Local papers publish an interview with U. S. employment officials to the effect that approximately 30,000 men are out of jobs, and while these figures may be correct, they do not reflect the true state of affairs.

Employent statistics in normal times show that about 15,000 men are continually shifting from one job to another, and this normal floating labor surplus has now been augmented by 5,000 or 6,000 returned soldiers. A number of manufacturing plants are at present closed for inventory and many other firms, having been engaged in war work, have cut their operations in order to readjust their plans to resume production on a normal basis.

Of the returned soldiers now in Detroit, it is estimated that 60 per cent are well provided with money and are desirous of resting for a short period before seeking positions. Labor officials have found that ex-army men out of work will not accept any job which may be offered, but are taking their time and are picking those they consider the most desirable.

A recent announcement which was given considerable publicity, and which told of a serious labor surplus, may have been prompted, it is hinted, by a certain class of employers with the idea of counteracting the effect of Henry Ford's announcement of a minimum $6 wage scale to all employees in all his plants. Ford's new scale has caused considerable hard feeling in certain business circles. It has not met with the approval of government labor bureau men who declare it is causing a labor movement toward Detroit which is not helping local conditions. It is also said that a feeling of dissatisfaction has been created among the workers of other plants.

Automobile and truck makers aver that in from 60 to 90 days the great majority of the plants will be operating on a normal peace basis. Several companies will greatly increase their production schedules in order to care for unfilled orders as well as new business. Part and accessory makers also anticipate a busy year. Thus, labor conditions will quickly adjust them-

selves and the shops will rapidly absorb the present excessive labor surplus.

Although conditions at other Michigan industrial centers seem to be rather sluggish at present, manufacturers are optimistic as to the future and it is evident that increased commercial activity will solve the labor problem in the near future.

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Two Released Aviators Return to Industry

WASHINGTON, Jan. 15—The United States Air Service continues to discharge its personnel daily. Among those who have recently secured honorable discharge are 1st Lt. Gerald A. Christopher, who will return to the Eclipse Machine Co. as assistant chief engineer, and Lt. Joseph Leopold, formerly chief engineer of the Walker M. Levett Co., who is now associated with the Jones-Matrola, Inc., New York, as mechanical engineer and sales manager.

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Firestone Steel Products Co. Adds Three to Its Sales Personnel

AKRON, Jan. 15—The Firestone Steel Products Co. has added three men to its sales force. A. D. Droeger as manufacturers' representative, will travel throughout the entire country. C. W. Flick will cover the eastern territory. He was formerly assistant sales manager of the Mason Tire & Rubber Co., and assistant manager of pneumatic tire sales with the B. F. Goodrich Co. J. C. Bailey has been made western representative. He comes from the Mason Tire & Rubber Co.

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Eight-Hour Day Adopted in Michigan

LANSING, Jan. 14—Eight hours is made a day's work in any mill, mine or factory in Michigan under the terms of a bill introduced this week in the Michigan house of representatives by John Holland of Gogebic County.

The bill, which is a short one, declares no person shall work more than eight hours in 24 "except watchmen and employees when engaged in making repairs or in case of emergency where life or property is in immediate danger." It states further that employees may work more than eight hours if paid time and one-half for all such over-time. It provides for the imposing of fines from $50 to $500 upon violators of the law.

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New Officers and Directors of Auto Body

LANSING, Jan. 15—The Auto Body Co., at its annual meeting on Tuesday, added M. V. C. Jackson, A. C. Stebbins and H. F. Harper to its board of directors. L. J. Griggs was permitted to withdraw. The following new officers were elected: President, F. M. Arbough; vice-presidents, M. V. C. Jackson and H. E. Thomas; treasurer, E. S. Porter; secretary, F. C. Rush. The new general manager, M. V. C. Jackson, assumed duties Monday. The plant is now operating at about half normal capacity, turning out 200 bodies daily.

General Motors Buys Reliance

New Plant for Olds Motor Works—First Step in General Expansion Planned

DETROIT, Jan. 14—The General Motors Corp. has purchased the Reliance Engineering Co., Lansing. The purchase price of $290,000 includes 31 acres of land, and buildings with 250,000 ft. of floor space, which will be used for the future expansion of the Olds Motor Works.

The completion of the new motor building, 240 by 500, 700 ft. loading docks and additional sidings left little of the Olds Motor Works site, and later acquired old fair grounds property available for additional building expansion. This cramped condition is now relieved by the purchase of the Reliance company, which adjoins the Olds property on the east.

The sale of the Reliance Engineering Co. was effected privately and the court order confirming the sale was filed Thursday. At 11 a. m. on that date the plant was to have been sold to the highest bidder. Samuel T. Douglas of Detroit was receiver, named under the receivership growing out of the case brought by the Union Trust Co. of Detroit against the owners of the property.

The assets of the company are sold in entirety. The General Motors Corp. assumes all outstanding contracts. The plant consists of factory buildings, pattern shop building, pattern vault building, shipping and office buildings. They are brick one and two stories.

Several years ago the Reliance Engineering Co. organized to manufacture gas, gasoline and kerosene engines, hoists, pumping outfits and cream separators. It was placed in receivership March 9, 1917. Lack of working capital was given as the cause of receivership action.

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DETROIT, Jan. 14.—Rumors that the General Motors Corp. is planning a period of huge expansion cannot be stilled. Although no definite announcement has been made by officials of the company, those who are in close touch with automotive conditions in Detroit claim that organization wheels have been set turning.

The expansion will undoubtedly affect all parts of the organization, although no advance publicity has been given out as to what will be done. While a great part of the new development will be in the production of motor cars, the manufacture of tractors will not be neglected, it is said.

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Continental Plans 15 to 25 Per Cent Increased Production for 1919

DETROIT, Jan. 14—Officials of the Continental Motors Corp. have adopted a 1919 production schedule which calls for an increased engine production of between 15 and 25 per cent over the 1918 output. The two plants of the Continental Corp. produced approximately 180,000 engines last year, a large number of which were built for the Government.

The company has installed new machinery and is still working upon government work. It is making a four-cylinder engine, but expects to complete the contract some time in February. It is also announced that A. H. Zimmerman, treasurer of the company, has resigned. His place has been filled by G. W. Yoeman, formerly assistant to the president.

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England Removes Gasoline Restrictions

LONDON, ENG.—(By Mail), Jan. 2—The Government restriction order, limiting gasoline consumption for private use, which was suspended until Jan. 10, has been revoked entirely. This concession enables motor vehicles to be used for any purpose without limitation of distance. Licenses to obtain gasoline are issued under the Finance Act, 1916, and the license feature must therefore remain in force. However, the Petrol Control Dept. is prepared to issue licenses to new applicants, and to increase the quantities allocated to existing license holders, and will endeavor as far as possible to meet all reasonable requirements.

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Airplane Manufacture Unrestricted

LONDON, ENG.—(By Mail), Jan. 2—British government orders of 1917 and 1918 which prohibited the experimental manufacture without a license of any airplane, engine, or any part of such a machine have been suspended. "Experimental manufacture" under those orders meant any manufacture not under government contract, and included preparation of working drawings, but not of general arrangement drawings.

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Standard Castings Co. Acquires Mastodon Tractor Tread

CLEVELAND, Jan. 15—The Standard Steel Castings Co., with headquarters here and in Chicago, has acquired the sales and manufacturing rights for the Mastodon tractor tread from the United States Traction Wheel Co. The Standard company is now in a position to supply the tread to tractor manufacturers.

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Motor Parts Co. Organized

DETROIT, Jan. 15—The Motor Parts Co. has been organized here by M. F. Ketten, R. B. Merrill and E. F. Wilkinson, formerly associated with the Phillip McCracken Co., and will specialize in the production and marketing of axle shafts for all standard cars. The concern has established offices at 212 Telegraph Building. Mr. Ketten, president of the company, is also president of the Consolidated Truck Co. Besides axles, the Motor Parts Co. will market the Green automobile theft protector, a device upon which a patent is now pending.

Rubber Imports Rise 235 Per Cent

December Improves Greatly as Import Restrictions Are Lifted—3 Years' Totals

NEW YORK, Jan. 13—Since the War Trade Board lifted its restriction on the amount of raw rubber for importation, the imports for December, 1918, show a material increase over the preceding month, jumping from 3363 tons in November to 11,292 tons in December. The December tonnage, however, shows a decrease of 1478 tons as compared with December, 1917, and a decrease of 802 tons as compared with the same month in 1916.

The total imports for 1918 show a loss of 16,381 tons over 1917, but a gain of 39,686 tons over 1917. For the year 1916 imports totalled 115,609 tons; for 1917, 171,676 tons; and for 1918, 155,295 tons. The following statistics for the three years have been compiled by the Rubber Association of America:

	1916 Tons	1917 Tons	1918 Tons
January	9,162	12,788	16,084
February	1,597	10,162	13,108
March	10,070	18,624	17,161
April	10,014	13,000	12,703
May	11,189	18,411	16,288
June	13,153	15,096	24,124
July	6,650	17,290	16,092
August	6,586	17,290	10,421
September	8,296	13,664	5,151
October	8,360	8,970	9,509
November	11,438	13,611	3,363
December	12,094	12,770	11,292
	115,609	171,676	155,295

Wisconsin Dealers to Gather

MILWAUKEE, Jan. 13—A two-day convention of motor car dealers of Wisconsin will be held under the auspices of the Milwaukee Automobile Dealers, Inc., during the twelfth annual show in the Auditorium, Jan. 24 to 30. The Milwaukee association in past years has devoted one day of show week to entertaining the dealers, but since an organization of state dealers was effected at a meeting held during the annual fall show in September, the congregation of the upstate tradesmen this time will assume the style and proportions of a real convention.

French Export Is Simplified

WASHINGTON, Jan. 13—Individual applications for export licenses for France will no longer be referred to the French High Commission, and individual applications for export licenses for Italy will no longer be referred to the Italian High Commission. This supplements the War Trade Board ruling 412, issued Dec. 13, 1918, and W. T. B. R. 453, issued Dec. 21, 1918. Exporters should be very careful before shipping to acquaint themselves thoroughly with the import requirements of the country of destination, as certain of the regulations which were in force prior to the signing of the armistice are still in full force and effect. Information as to French import restrictions may be obtained by applying to the French High Commission, 15th and M Streets, Washington, D. C., and for Italian import restrictions to the Italian High Commission, 1712 New Hampshire Avenue, Washington, D. C.

Export Conservation List Removals

WASHINGTON, Jan. 13—Additional removals from the Export Conservation List include the following, on which licenses will now be granted freely for export:

Ash wood
Balata
Birch wood
Chestnut wood
Crude rubber
Fir timber
Gutta-percha
Gutta-joolatong
Gutta-siak
Lumber
Mahogany wood
Metallic tin
Mica
Oak wood
Pig tin
Pine, yellow, measuring 12 in. by 12 in. and larger size, or 25 ft. long and longer
Plate, as follows:
  Terne
  Tin
Plywood and veneer of all kinds
Pulp wood
Quebracho wood
Rubber, as follows:
  Balata
  Crude
  Guayule
  Gutta-joolatong
  Gutta-percha
  Gutta-siak
Spruce wood
Tin, as follows:
  Block
  Metallic
  Ore
  Pig
  Plate
Walnut wood

Restrictions Lifted on Motor Imports and Exports

WASHINGTON, Jan. 15—The Government restrictions on the importation of agricultural implements, which includes farm tractors, were removed Dec. 24. On Dec. 19, the Government restrictions on the importation of cars, carriages and other vehicles, including motor cars and trucks, were also removed.

Many export limitations have also been lifted. It is understood that motor car, truck and accessory exporters have no difficulty in shipping to South America or to Spain. Permits from the Danish government must still be obtained when making shipment to Denmark.

The embargo prohibiting the importation of motor vehicles into England, France and Italy has not yet been lifted, so that no space is obtainable for such vehicles on outgoing steamers to those ports, although some accessories are being shipped. The necessity of procuring export licenses from the Shipping Board is still in effect.

$31,000,000 Wright-Martin Cancellation

NEW YORK, Jan. 15—It is reported that contracts held by the Wright-Martin Aircraft Corp., totaling $31,000,000, have been canceled. The greatest part of the cancellations will affect the Long Island City Government-owned plant, which was to have turned out 300 hp. Hispano-Suiza engines on a fee basis.

Fit Tractor to Farm or Vice Versa?

Economical Operation Hinges on Proper Answer, Says Farm Management Professor

MINNEAPOLIS, Jan. 10—Who will tell the farmer what he wants to know about tractors—what he must know if a tractor is to be an economical investment for him? The tractor manufacturer does not tell him in the literature he sends out. The tractor salesman does not tell him because he usually does not know himself and because his function is to sell the machine his employer builds. The dealer does not tell him because too often he has contracted to sell a tractor which he may have bought with too little regard to whether it is adapted to his local conditions, and it is up to him to sell it whether or no.

Must the farm be adapted to the tractor, or the tractor to the farm? This is the all-important question to the farmer if he is to make economical use of a tractor. Somebody must tell him—who is going to do it?

The question was asked by F. W. Peck, assistant professor of farm management, University of Minnesota, who spoke to the Minnesota retail implement dealers at their fifteenth annual convention at Minneapolis this week. Professor Peck took as his subject, "The Use of Tractors on Minnesota Farms," and he attacked it from an angle different from any ever before presented to a dealers' convention and one which must vitally interest every manufacturer of tractors.

Things Farmer Wants to Know

Every farmer who buys a tractor must ask certain questions, asserted the professor. These are:

1—Will a tractor do my work more rapidly than my horses can?
2—Will it do as good work?
3—Can I save hired help by using a tractor?
4—Can I farm more land with a tractor?
5—Are my fields adapted for the use of a tractor?
6—Will a tractor displace any of my horses?
7—Can I use a tractor to advantage in work other than plowing?
8—What size of tractor should I buy
9—How many acres will the various outfits plow per day?
10—How much does it cost to plow per acre?
11—Can I use a tractor

The fundamental idea developed by Professor Peck is that profit on the average farm depends upon the proper utilization of labor on the farm, and that in properly utilizing labor lots of power is used. Thus the question resolves itself into whether the tractor is the ideal power unit which will result in the proper utilization of farm labor.

In other words, the test of economy in tractor use is not the displacement of horses nor the cost per acre of plowing,

but the increase in the efficiency of the man per hour or per day.

If, by using a tractor, the man power is increased sufficiently, then the tractor is an economical proposition, otherwise not. For this reason the 11 questions asked by the farmer are logical, commonsense and necessary. Unless some one can answer them affirmatively, or definitely, as the case may be, the farmer cannot know whether or not his particular circumstances will justify the purchase of a tractor and he must take a chance. Taking a chance in farming, too, is likely to prove expensive. This means, therefore, that the manufacturer must build, and the dealer must sell, such a tractor that it will give satisfactory answers to these questions.

The net conclusion reached by Professor Peck is that at the present time the cost of tractor farming is in general no less than the cost of horse farming, irrespective of the fact that it has cost $150 a year to maintain a horse for the years 1917 and 1918, but that, inasmuch as the tractor, provided it is adapted to the particular farm, increases the product of the farm per man, therefore is an economical investment on the average farm of 160 acres and over.

Before adjournment officers for the ensuing year were elected as follows:

President, C. W. Lyman, Northfield, Minn.; vice-president, N. S. Solum, Hitterdahl, Minn.; directors, G. A. Meyer, Lake Elmo, Minn., and Aug. Lundgren, Warren, Minn.; delegate to the National Federation, E. P. Lynch, Faribault, Minn. C. I. Buxton, Owatonna, Minn., was re-elected secretary and treasurer.

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Automotive Corp. President Addresses Automotive Engineers

CHICAGO, Jan. 11—"If it is desirable and convenient for the operator to be always on the tractor, then it is desirable and convenient for the farmer to do all his work riding on his horses," was the argument of A. H. Wyatt, president and general manager of the Automotive Corp. of Fort Wayne, Ind., which aroused interest at the monthly meeting of the Mid-West Section of the Society of Automotive Engineers last night.

Mr. Wyatt's paper was entitled "Line Control and Power Steering as Applied to Tractors," and consisted chiefly of a discussion of these features as developed in his design. Mr. Wyatt says that his tractor is just as docile and observant of the rules of the rein as is a horse. Every move the tractor makes is controlled by reins. Two reins are used to steer, operate the clutch and to control the engine speed, and a third is used to shift the gears.

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Wyandotte Cleaner Ready

DETROIT, Jan. 11—The J. B. Ford Co., Wyandotte, is now marketing its Wyandotte metal cleaner. This product is intended to remove japan, shellac, paint, oils and greases, preparatory to recoating or repainting. It can also be used as a garage floor cleaner, as it has the quality of cutting and cleaning oil and grease.

Randles Resigns from M.T.C.

Will Return to Duties as Vice-President and General Manager of Foote-Burte Co.

WASHINGTON, Jan. 13—George E. Randles, vice-president and general manager of the Foote-Burte Mfg. Co., Cleveland, who for 16 months has been Director of Maintenance for the Motor Transport Corps, has resigned and will return to Cleveland.

Mr. Randles, during his connection with the Motor Transport Service, contributed greatly to the formidable program of that service, and his tenure of office is looked upon as a concrete illustration of the patriotism, subordination of individual interests to the needs of the Government and the sterling loyalty of the American business man.

Upon the acceptance of his resignation, Mr. Randles was called to the large reception room of the Transport Service and, in the presence of the personnel, officers and civilians, was presented with a gold watch as a token of the high esteem and kind regard of his co-workers. The presentation address was made by Lt.-Col. Edward Orton, Jr.

During his direction of the Maintenance Division Mr. Randles designed and standardized a base repairshop for Army use, which is capable of accomplishing tasks which no commercial or manufacturing institution can do. Also he built a crating shop at Camp Holabird, Md., where trucks can quickly be taken apart for shipment.

Another valuable contribution to the service has been the organization and training of the personnel whose work is the operation of these shops; the securing of the necessary thousands of automobile mechanics, the fitting of them into their respective niches and the drilling of them in the necessary team work to make their efforts efficient. This has been a complex task, but it was successfully handled by Mr. Randles. This work has been accomplished so as to make it possible to carry out not only the present program of the Army but it will also meet the demands of peace and be ready for any future wars.

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Necessity of Roads Pointed Out

WASHINGTON, Jan. 13—The Senate Committee on Post Office and Post Roads, which deals with all congressional highways legislation, declared this week that there must be no letup in road construction despite the armistice, due to the need of roads for food distribution. Three measures are pending before Congress on highway matters which are designed to increase the national highways mileage and to improve those roads now in existence, as follows:

Joint resolution "200," authorizing the transfer from the War Department to the Department of Agriculture of all available dispensable and suitable war material for distribution to the highway departments of the several States for use on the highways.

Senate bill "5088," increasing the present unexpended appropriation of about $60,000,000 for road purposes by the addition of $125,000,000 for expenditures to June, 1920, and $100,000,000 a year thereafter for 4 years. It also is proposed to increase the appropriation for national-forest roads of $1,000,000 a year on the present 10-year road building program by a sum sufficient to construct 17,000 miles of forest roads, which the Government has already planned and which are necessary in order to utilize the vast resources of the national forests. The estimated cost of these roads is $50,000,000.

House bill "13308" carries an appropriation of $1,000,000 for an extension of motor-truck parcels post service. This is an increase from the $300,000 provided in the last post office appropriation bill, which also authorized the War Department to transfer to the Post Office Department motor trucks for which it had no further use. Under last year's appropriation 27 motor truck routes were established, all but one of which were operated east of the Mississippi River. The results, even in the initial stage, are such as to warrant an increase in the number of routes and their extension to the trans-Mississippi region, where rail and water facilities of transportation are altogether inadequate.

Senate bill "5088" has the approval of President Wilson and Secretaries Houston and Baker.

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Additional Names of Chicago Exhibitors

CHICAGO, Jan. 13—Seven passenger-car, nine truck and twenty-four accessory exhibitors will have their products on display at the Coliseum, Jan. 25 to Feb. 6. The list of names is as follows:

Passenger Cars

Templar Motor Corp.	Cleveland
Maibohm Motors Co.	Racine
Dorris Motor Car Co.	St. Louis
Apperson Bros. Automobile Co.	Kokomo
Saxon Car Co.	Chicago
Rue Motor Co.	Chicago
Marmon Chicago Co.	Chicago

Trucks

Dorris Motor Car Co.	St. Louis
Panhard Motors Co.	Grand Haven, Mich.
Sanford Motor Truck Co.	Syracuse
Mutual Truck Co.	Sullivan, Ind.
Fulton Motor Truck Co.	Farmingdale
Fowler Motor Truck Co.	Chicago
Rue Motor Co.	Chicago
Available Truck Co.	Chicago
Diamond T Motor Truck Co.	Chicago

Accessories

Gray Heath Co.	Chicago
Hercules Buggy Co.	Evansville, Ind.
Jefferson Electric Mfg. Co.	Chicago
Johnson Auto Lock Co.	Chicago
Morand Bros.	Chicago
Natl. Wire Wheel Co. Works	Geneva, N. Y.
Perfex Radiator Co.	Racine
Trindl Machine Works	Chicago
U. S. Auto Supply Co.	Chicago
West Steel Casting Co.	Cleveland
Bell Tire & Rubber Co.	Chicago
Essenkay Products Co.	Chicago
Mitchell Bynon Co.	Chicago
Stahl Rectifier Co.	Chicago
Peter C. Cole	Chicago
Ahlberg Bearing Co.	Chicago
Empire Mfg. Co.	Binghamton, N. Y.
F. W. Wakefield Brass Co.	Vermillion, O.
Radium Dial Co.	Pittsburgh
U. S. Auto Gear Shift Co.	Eau Claire
National Mileometer Co.	Detroit
Holland Brass Works	Chicago
Inland Machine Works	St. Louis
Ahlberg Bearing Co.	Chicago

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Boston May Get Truck Show

BOSTON, Jan. 13—There is more hope now for trucks being taken care of at the Boston show than there was a few weeks ago. At first it was figured out that the owners of Mechanic's building would rather keep the wool, flour, etc., stored in the basement where they would get a big rent week after week than have one week of a motor truck section. And that would mean a car show solely. Now there are plans to have the basement emptied and the entire show will be held in one week instead of planning to stretch it over two weeks.

Trial of Jobbers Is Begun

Jury Drawn for Legal Battle, Which Is Expected to Last About a Month

NEW YORK, Jan. 12—The trial of the members of the Jobbers' Association on a charge of violating the Sherman anti-trust law began to-day in the United States District Court in this city.

The first day was taken up with the usual preliminaries and the second day's session was not to begin until 2 p. m. because of other business to which Judge Hand must attend. It is anticipated that the trial will last about a month. The sessions are in the Post Office building in City Hall Square. The prosecution is being handled by District Attorneys Geyler, Matthews and Williamson.

The chief counsel for the defense is James H. Wilkerson, Chicago, formerly a United States district attorney. He is assisted by Claude A. Thompson and Emory Buckner, New York, both experienced in Government cases. The following men are represented by their personal attorneys: George Edmunds, Edmunds & Jones, Detroit, by Attorney L. W. Goodenough; T. M. Brooks, Automobile Supply Co., Chicago, by Attorney C. M. Peters; William K. Norris, McQuay-Norris Mfg. Co., Chicago, by Attorney John F. Greene; F. B. Caswell, Champion Spark Plug Co., Toledo, by Attorney Edward J. Marshall.

The jury was drawn to-day. It is said that an unusual number of witnesses has been called by both sides and it is expected that the case will be fought with unusual vigor by both sides.

Representatives of other trades and trade organizations are interested in the outcome and the representative of at least one other organization, from Texas, is here to watch the proceedings.

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Would Establish 600 Motor Truck Routes

WASHINGTON, Jan. 13—Establishment of motor truck routes as a means of reducing the cost of living by transporting farm product to the cities was advocated yesterday by Fourth Assistant Postmaster General Blakslee in asking the Senate Post Office Committee to appropriate $8,975,000 in the Post Office bill for that purpose. Under the House bill $1,000,000 is provided to be used in extending the plan.

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No Change in Gasoline Price Likely in Canada

TORONTO, Jan. 13—It is unlikely that there will be any change in prices of gasoline and oils. The flat rate plan, which was put in effect by one of the large firms last April, will be continued. A number of firms handling gasoline and oils have been urging the adoption of a standard rate, but so far little progress has been made.

Some of the oil men are not inclined to regard the plan as feasible for the Dominion, basing their views on the long hauls to various points. In spite of the large falling off in fuel oil sales owing to the closing of munitions plants, the price has only dropped a cent a gallon. The manufacturers are meeting the situation by lessening the output of fuel oil and increasing the production of gasoline. It is stated that the shortage of coal in many districts this season is causing much larger demands than usual for oil for fuel.

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Japanese Commission Visits Nash Motors

KENOSHA, Jan. 13—Charles W. Nash and the Nash Motors Co. last week entertained the commission of Japanese army officials who are making a tour of military manufacturing centers of the United States in behalf of the government of Japan. The commission consists of Maj. Saburo Yamanaka, Maj. Tomotsugu Tohara, and Maj. Zenturo Miki. Mr. Nash tendered the visitors a luncheon, following which the big Nash plant was inspected.

Price Changes

Hupp Prices Reduced

DETROIT, Jan. 13—The Hupp Motor Car Co. has reduced the price of its roadster and touring car. The prices of the other models remain unchanged. The new price list is as follows:

Model	New Price	Old Price
Roadster	$1335	$1500
Touring Car	1335	1500
Coupe	2100	2100
Sedan	2135	2135

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Grant Prices Down $25

CLEVELAND, Jan. 13—The Grant Motor Corp. has revised the prices of its models as follows:

Model	New Price	Old Price
Roadster	$1220	$1245
Touring Car	1220	1245
Sedan	1745	....
Coupe	1725	....
Detachable Sedan	1500	....

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Peerless Prices Advanced

CLEVELAND, Jan. 14—The Peerless Motor Car Co. has advanced its prices as follows:

Model	New Price	Old Price
7 Passenger Touring	$2,760	$2,550
4 Passenger Roadster	2,760	2,550
4 Passenger Coupe	3,320	3,050
7 Passenger Sedan	3,530	3,250
7 Passenger Sedan Limousine	3,720	3,690

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Oakland Prices Drop

PONTIAC, Jan. 14—The Oakland Motor Car Co. has reduced the price of all 1919 commercial car models $110. The price list is as follows:

Model	New Price	Old Price
Touring Car	$1,075	$1,185
Roadster	1,075	1,185
Sedan	1,650	1,760
Coupe	1,650	1,760

Liberty Fuel Proves 65% Benzol

Results of Tests by Fuel Administration Revealed—Nearly 30% Kerosene

WASHINGTON, Jan. 14—Liberty Fuel, announced several weeks ago as having been discovered by Captain Wiesgerber, is largely benzol. As a matter of fact it is 65 per cent benzol mixed with 25 to 30 per cent of kerosene with a small percentage of amyl acetate. The Fuel Administration has completed an anlysis of the liquid which shows that these are its principal ingredients. History reveals that there is nothing new in the mixture of benzol and kerosene. As long ago as 1911 and 1912 a number of tests were conducted on the Brooklands Speedway in England on such a mixture which at that time proved quite satisfactory. The limiting factor in the use of such a mixture, however, is the small amount of benzol available and the expense in producing it. It is considered improbable by oil experts that the cost of producing benzol in quantities necessary to make it commercially valuable as a substitute fuel can be brought down to the point where it can be sold as cheaply as gasoline.

The principal difficulty in using benzol is that it solidifies at comparatively high temperature as compared with gasoline. For example, benzol will crystallize at 18 deg. Fahr. On the other hand the boiling point is 175 deg. Fahr. as against about 140 deg. for the average grade of good gasoline. This would indicate that it would be more difficult to start a cold motor on a benzol-kerosene mixture than on gasoline.

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Large Space for Accessories at K. C. Tractor Show

KANSAS CITY, Jan. 14—So many unique features have been planned for the coming tractor show to be held in this city Feb. 24 to March 1 that it will be quite a departure from the usual trade display. One of these is the extra large amount of space which is being taken for tractor accessories.

Another feature is that nothing will be allowed upon the grounds except tractors and their accessories. There will be no side shows, no opportunity for a man to exhibit something which does not strictly belong to the aim of the exhibit.

Again no souvenirs will be allowed, no presents to attract visitors to particular exhibits. The only matter allowed to be given away will be literature describing the articles the dealers has to display. Neither will there be any catalogues this year.

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Winton Shifting Back to Peace Time Production

CLEVELAND, Jan. 15—All the old officers and directors of the Winton Co. were re-elected at the annual meeting

held Tuesday. The company, which has been devoting its efforts entirely to war work, is gradually shifting back to a peace basis. It is still working on government contracts, but is resuming production at the rate of about five cars daily.

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100,000 Ford Tractors for 1919

DEARBORN, Jan. 15—Production of 500 Fordson tractors daily within the next 90 days is called for in the new output schedule of Henry Ford & Son Co. The plant is at present turning out 225 machines daily, and within 30 days will be hitting well above the 300 mark. Officials of the company announce that the 1919 production schedule calls for the completion of 100,000 tractors. This is more than three times the 1918 output, when 30,000 tractors were made and sold.

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Hansen Leaves Stewart-Warner to Manage Standex

CHICAGO, Jan. 15—V. N. Hansen has resigned as sales supervisor at the Stewart-Warner Speedometer Corp. He will devote his time to the management of the Standex Mfg. Co., which he has organized with offices and plant at 341-349 E. Ohio Street, to manufacture and market motor specialties under the trade name "Standex." Prior to his connection with Stewart-Warner, Mr. Hansen was engaged in the manufacture of the V-Ray spark plug at Marshalltown, Ia.

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Monroe Motor Co. at Receiver's Sale

PONTIAC, MICH., Jan. 14—The receiver's sale of the manufacturing plant of the defunct Monroe Motor Co. will be held here Jan. 25, at 1 p. m. The factory property consists of modern buildings having 100,000 ft. of floor space, sprinkler, heating and lighting systems, and is suitable for automobile, truck or tractor manufacture.

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New Studebaker Plant for 100,000 Annually

SOUTH BEND, Jan. 14—The Detroit plants of the Studebaker Corp. will continue the production of six-cylinder cars and parts; the new Studebaker plant here will be devoted to the production of the new light-four. The new South Bend plant will have an annual capacity of 100,000 cars.

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Olds Production to Exceed Normal

LANSING, MICH., Jan. 14—The Olds Motor Works expects to reach its normal pre-war production by Feb. 1. The factory is now running at 80 per cent of its normal capacity. The company contemplates to increase its production to exceed by 25 per cent all previous records.

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Spencer With Indiana Electric Steel Co.

INDIANAPOLIS, Jan. 15—M. G. Spencer, formerly connected with the Midvale Steel Co. and later with the Watertown Arsenal as chief chemist, is now in charge of the metallurgical operation of the Electric Steel Co. of Indiana.

2,000,000 Tractors on Farms in 10 Years

Agronomist Taylor Makes a Startling Prediction—Says Three-Bottom Is Best

KANSAS CITY, MO., Jan. 15—That 2,000,000 tractors would be operating on the farms of this country within the next 10 years was the startling prediction made this morning by W. E. Taylor, agronomist, of Deere & Co., Moline, to the members of the Western Association of Implement and Vehicle Dealers in session in this city. These 2,000,000 tractors, said the speaker, would displace 50 per cent of the horse-drawn implements used on the farm at present. The 240 concerns making tractors, he asserted. will build 200,000 machines during the coming year.

In discussing the operating efficiency of the present type of tractor, Taylor gave it as his opinion that it has not proved its adaptability for every kind of soil. For example, it was not suited for steep hills or side hills, nor was it adapted to perform on rough or stony soil. However, wherever it could be used it reduced the cost of farm operation and increased production. He cited the results of the Harrisburg demonstration as typical of tractor operation costs.

The three-bottom plow, in Taylor's opinion, was the most economical machine for average farm use. The two-bottom unit, he said, did not show any economy over horse operation. On the other hand, the three-bottom machine and one man could accomplish as much work as two men and ten horses.

The future of agriculture, said Taylor, depended for its growth upon the development of the tractor, and as an earnest of this conclusion he advised the dealers to push the sale of tractors.

The Century Theater, where the convention is being held, was crowded, although the attendance was not as great as in past years. Governor Allen of Kansas also delivered an address.

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Fuel Conservation Orders Withdrawn

WASHINGTON, Jan. 15—All fuel conservation orders have been withdrawn by the United States Fuel Administration in so far as relates to coal, and industries can now use any quantity of coal they desire or require. This information was made public to-day in a formal announcement by the United States Fuel Administration.

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Portland Show Feb. 24-March 1

PORTLAND, OREGON, Jan. 20—The Portland Automobile Dealers will hold a show Feb. 24 to March 1 in the Portland Auditorium, which affords 40,000 sq. ft. of floor. The show will be limited to the membership of the association, which has 38 members, and will contain probably 44 makes of automobiles, 24 makes of trucks and 6 makes of tractors, as well as considerable automotive equipment. The dealers' state manager, M. O. Wilkins, plans to stage a run a couple of weeks before the show from Portland to Seattle, and has invited the Washington dealers to come to Portland for the show. They also expect to have the Oregon County dealers come to Portland during that week, and it is probable that a meeting will be held Friday, Feb. 28.

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Jobbers Meet June 2-6

CHICAGO, Jan. 20—The Automotive Equipment Association, the jobbers' association with its new name, will hold its next meeting June 2, 3, 4, 5 and 6 at the Homestead Hotel, Hot Springs, Va. June 2 and 3 will be taken up with meetings of committees and the directors. The general sessions will be held June 4, 5 and 6.

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Sunbeams for Indianapolis Race

PARIS, FRANCE, Jan. 15—Special Cable—Two more foreign drivers have been entered for the 500-mile race on the Indianapolis Speedway, May 31. The British Sunbeam company has entered two cars which are to be driven by Chassagne and Christiaens. It is considered probable that the Fiat company will start a car, though no driver has been nominated yet.

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Trade-Mark "Ford" More Than Name

(*Continued from page* 186)

what everybody knows. The use of the term has become so extensive, he adds, that he is convinced there was a time when the word "Ford" did not mean the individual in Michigan who is named Henry Ford, but primarily meant a particular kind of automobile. "The automobile is probably known by numerous people," he continues, "who are not aware of the fact that it is a man's name." He declares it is probable that the man Henry Ford first became widely known because of the reputation of the automobile rather than the automobile becoming known because it was made by Henry Ford.

The commissioner holds that the Ford Co. has a right to curtail the liberties of another by the name of Ford if the other Ford attempts to market automobile parts and accessories under the name of a famous automobile. He declares the right is not in the name but in the particular use of the name, and adds that it is hardly conceivable that another Ford could in mere ignorance infringe upon the Ford company's mark.

In conclusion he avers that if Ford was at one time merely a surname it is now no longer so. It is now as truly an index of a reputation and a mark of origin as any mark one could think of and he declares it ought to be registered as the courts have held it may be monopolized.

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Morgan Chief Engineer for Cleveland Co.

CLEVELAND, O., Jan. 15—Major N. B. Morgan has been appointed chief engineer of the Cleveland Tractor Co. He had been engaged in automobile engi-

neering for 14 years until June, 1917, when he was appointed assistant to the chief of the Ordnance Department of the Army.

—

Latin-American Tractor Possibilities

WASHINGTON, Jan. 13—Extensive areas of agricultural land in Latin-American countries offer a rich field for the development of farm tractor trade, states a special tractor report compiled by the Bureau of Foreign and Domestic Commerce. Many of the estates, comprising hundreds of thousands of acres, still cultivate their crops of grain, sugar, and cotton under the old systems, that require large numbers of laborers and horses.

Power farming on these great plantations invariably shows economy of time and expense, and the recent increase in shipments of tractors from the United States to Latin America indicate that the more progressive ranch owners are beginning to realize the value of new methods. In the fiscal year 1918 more tractors were shipped from this country to the Latin American countries than in all the four last years preceding, and in the first quarter of the 1919 fiscal year these exports amounted to more than a third of the total 1918 shipments.

The direct cause of this unprecedented demand for tractors in Latin America is doubtless the awakened interest in agriculture growing out of war-time needs and prices. The value of the tractor in increasing the agricultural production of Latin America is almost equalled by its importance as a road maker. The lack of transportation facilities is acutely felt in some of the richest sections of South America, and the tractor is proving of incalculable advantage in the construction of needed highways.

One of the chief obstacles faced by the manufacturer in the introduction of tractors is the natural aversion of a conservative rural community to new and complicated mechanical appliances. Inexperienced operators, failing to meet with success in the use of an untried machine, condemn and abandon it. The manufacturer must prepare to overcome this difficulty by providing ample instructions and demonstrations and should, moreover, take special pains to furnish the proper kind of tractor for the particular class of work desired.

Another obstacle in selling tractors in Latin America is the high cost of gasoline, but it is probable that with the close of the war there will be a reduction in the price of this fuel. In contrast with the scarcity of fuel for tractors, the ranch owner has available a large supply of horses and practically unlimited natural pasture, making his outlay for animal power comparatively small.

To meet this condition the manufacturer must demonstrate that the land can be much more quickly and evenly worked, and to a much greater depth, with the use of a tractor than with horses.

Tire Export Figures Are Satisfactory

Average Monthly Value for 5 Months Ending November in Excess of That of Previous 12 Months

NEW YORK, Jan. 15—Supplementing the information given in tabular form covering exports of automobile tires by countries and years, given elsewhere in this issue, the following figures representing the value of tire exports during July, August, September, October and November are of interest as indicating that our export trade is being maintained despite shortage of crude rubber and the fact that the cars of many countries are restricted in operation in consequence of the scarcity of gasoline. Our exports of automobile tires for the five months are as follows:

1918	Value
July	$1,217,584
August	1,566,589
September	1,321,034
October	930,204
November	1,268,845
	$6,304,256

During the fiscal year which ended June 30, 1918, our monthly average value of automobile tire exports was $1,166,472. For the four months enumerated above the average per month is $1,260,851.

—

Petry Co. to Bill Baldwin Products Direct

PHILADELPHIA, Jan. 13—By arrangement with the Baldwin Chain & Mfg. Co., Worcester, Mass., the N. A. Petry Co., 1307 Race Street, Philadelphia, will in future invoice all Baldwin products direct to their customers. Large stocks of chain and sprockets are carried at the Philadelphia warehouse.

Exports of Cars, Trucks and Parts, 1902-1906

	1902	1903	1904	1905	1906	Totals by Countries
Europe:						
Austria-Hungary	$13,106	$1,850	$3,500	$26,051	$1,706	$46,213
Belgium	7,797	3,670	22,971	38,220	10,465	83,123
Denmark	9,905	6,431	11,549	8,922	44,858	81,665
France	59,051	98,029	92,576	252,742	282,317	784,715
Germany	24,491	30,798	97,303	154,141	99,732	406,465
Gibraltar	....	....	....	....	4,600	4,600
Greece	....	....	....	520	362	882
Italy	2,200	8,200	10,567	159,396	265,970	446,333
Netherlands	5,285	10,164	11,909	14,690	16,151	58,199
Norway	....	2,500	10,794	9,245	3,653	26,192
Portugal	....	12,904	1,904	3,784	5,417	24,009
Rumania	....	....	240	4,973	60	5,273
Russia in Europe	1,023	1,688	74,842	72,551	47,778	197,882
Spain	....	1,506	17,820	15,184	5,660	40,170
Sweden and Norway	1,697	....	....	....	....	1,697
Sweden	....	1,226	9,625	54,640	55,033	120,524
Switzerland	....	3,660	5,440	5,951	3,846	18,877
United Kingdom	671,553	670,811	649,641	607,401	948,995	3,548,401
North America:						
Bermuda	1,500	....	775	....	130	2,405
British Honduras	....	....	....	....	124	124
Canada	37,439	136,586	330,952	441,425	647,125	1,593,527
Newfoundland and Labrador	....	2,025	997	7,300	1,313	11,635
Central America:						
Costa Rica	....	....	....	....	1,680	1,680
Guatemala	....	21	....	600	1,365	1,986
Honduras	....	....	....	....	10,752	10,752
Nicaragua	....	....	38	125	280	443
Panama	....	....	....	1,020	169	1,189
Salvador	....	....	....	65	....	65
Mexico	27,710	24,762	113,280	119,986	422,626	708,364
West Indies:						
British	....	4,948	5,758	14,982	35,057	60,745
Cuba	11,152	11,345	46,999	96,538	205,250	371,284
Dutch	....	....	....	50	436	486
French	....	800	....	88	300	1,188
Haiti	....	....	....	30	180	210
Dominican Republic	....	....	....	400	....	400
South America:						
Argentina	10,203	6,588	12,997	18,350	20,923	69,061
Brazil	2,150	6,900	2,346	4,010	27,550	42,956
Chile	....	....	1,693	5,659	22,795	30,147
Colombia	....	148	954	983	995	3,080
Ecuador	....	10,921	10,442	653	340	22,356
Guinea:						
British	....	....	....	450	....	450
Dutch	....	....	14	....	20	34
Peru	3,000	....	4,031	50,597	10,195	67,823
Uruguay	....	....	....	....	8,308	8,308
Venezuela	....	....	2,629	666	5,048	8,343
Asia:						
China	6,645	5,200	12,389	11,091	7,764	43,089
British India	4,299	15,032	70,479	56,790	31,046	158,315
Straits Settlements			2,648	5,931	6,277	34,187
Other British			1,440	9,383	321	11,144
Dutch	1,200	2,544	2,335	20,169	18,007	44,255
Hongkong	1,175	1,600	780	815	155	4,525
Japan	9,513	13,737	22,875	13,438	14,775	74,338
Siam	....	....	....	1,782	167	1,949
Turkey in Asia	....	....	....	865	....	865
British Australasia	9,581	48,078	164,130	98,562	160,944	481,295
French Oceania	....	....	....	1,200	....	1,200
Philippine Islands	14,216	3,085	4,252	1,702	9,467	32,722
Africa:						
British Africa:						
West	....	....	....	....	2,500	2,500
South	12,637	59,048	57,202	54,511	24,820	208,227
Canary Islands	....	260	....	....	....	260
French Africa	....	....	....	1,040	....	1,040
Portuguese Africa	....	....	654	679	....	1,333
Egypt	....	....	1,835	10,897	1,200	13,932
Totals	$948,528	$1,207,065	$1,895,605	$2,481,243	$3,497,016	$10,029,457

This table supplements the one appearing on page 104, and giving exports of cars for the 12 years 1907 to 1918.

Pro and Con of Government Railroad Ownership

Sentiment Appears Against It in General, and Both the Association of Railroad Executives and the Holders of Railroad Securities Oppose It

NEW YORK, Jan. 13—During recent weeks there has been a great variety of conversation and "news" about the railroads. There has been a lot of talk about Government ownership, but there is no well defined faction that has come out in favor of it. A few newspapers have advocated it, but *sentiment generally seems to be not in favor of the operation of the railroads by the Government.* However, there is a lot of conversation on the subject of Government ownership.

Early this week, Dow, Jones & Co. sent out from Chicago a lengthy telegram addressed, presumably, to a large number of business publications, among them AUTOMOTIVE INDUSTRIES. The telegram is reproduced herewith:

There are two well defined factions at work:

1—*The railroad executives' association, which is made up of the men who manage the roads.*

2—*The "Warfield faction," consisting mostly of presidents of insurance companies, presidents of banks and trust companies and others, who are the owners of the railroad properties.*

Faction No. 1 is, therefore, the men who manage the roads. Faction No. 2 is the people who own the roads.

Both factions are working toward the same end in that they are opposed to Government ownership.

Faction No. 1, the managers, has advanced a definite plan.

Faction No. 2, the owners, will shortly announce a plan, but has not as yet except that it opposes Faction No. 1's plan.

It is said by some that Faction No. 1, the managers, is trying to carry water on both shoulders, so that their jobs will be safe no matter what happens.

Faction No. 2, the owners, wants the investment in the properties safeguarded.

The Executives' Plan

Faction No. 1, the road managers and executives, wants Government regulation and protection, but NOT Government ownership. It proposes:

A—Federal incorporation, which would be incorporation nationally instead of in states, as at present.

B—A director general of railroads with a seat in the Cabinet of the President of the United States.

Faction No. 2 will announce its plan shortly, but inasmuch as neither faction will write the bill that Congress must pass on the subject, both factions are disseminating information, and the reading of conflicting stories leaves the average reader somewhat up in the air.

The statement that AUTOMOTIVE INDUSTRIES received concerning Warfield was prompted, it is stated, by the fact that John J. Mitchel, a Chicago banker, who is also vice-president of Warfield's "securities owners' association," was reported the other day to have come out in favor of Government ownership. The telegraphic statement denies that Mitchel favors Government ownership.

Recently Warfield has issued other statements in favor of his ideas. The statement that AUTOMOTIVE INDUSTRIES received was sent from Chicago by Dow, Jones & Co., which prints the *Wall Street Journal* and also operates a ticker and news service. It frequently sends out statements for financial men as a matter of courtesy, which, it states, it did in this case.

Warfield is president of the Seaboard Air Line, a large southern road with 3000 to 3500 miles of trackage and which in 1917 did over $30,000,000 of business. He is also president of the Continental Trust Co. of Baltimore. He some time ago organized and is president of the National Association of Owners of Railroad Securities. He, at the time the Government took over the roads, was active in securing for the roads better contracts than the Government at first offered. It is said that many of the executives in Faction No. 1 are in accord with Warfield's ideas.

SPECIAL DISPATCH FROM CHICAGO TO AUTOMOTIVE INDUSTRIES: CHICAGO, ILL., Jan. 10.—S. Davies Warfield, of Baltimore, president of the National Association of Owners of Railroad Securities, and of the Continental Trust Co., of that city, has been in Chicago since Monday in consultation with the executive committee of the National Industrial Traffic League in connection with plans for the return of the railroads to private operation. As a result of these conferences, it is understood he has adopted many suggestions made by the committee. Mr. Warfield was also in consultation with John S. Miller, of the law firm of Miller, Starr, Brown, Packard & Peckham, who is one of the advisory counsel of the securities association, together with ex-Senator Elihu Root, John G. Milburn, New York; Hugh L. Bond, Jr., Baltimore, and Forney Johnston, Birmingham, Ala.

He conferred with Luther M. Walter, of general counsel of the association and of the firm of Borders, Walter & Burchmore; also with John J. Mitchel, president of the Illinois Trust and Savings Bank, who is vice-president of the Securities Association.

Asked regarding Mr. Mitchel as having been quoted as in favor of Government ownership, Mr. Warfield in passing said: "The intentions of Mr. Mitchel at the time were misunderstood; he is no more in favor of Government ownership than I am." Being told that Director General McAdoo had resigned and would immediately return the railroads to their owners, Mr. Mitchel states: "If this takes place wtihout remedial legislation the financial chaos will be disastrous, and I would prefer Government ownership."

The National Industrial Traffic League is of national scope and represents through constituent membership leagues and others over 250,000 shippers of the country. The executive committee, which has been in session here since Monday, is composed of members of traffic bodies located throughout the country.

Before leaving for the East, when asked regarding the securities association's plans, Mr. Warfield said: "The National Association of Owners of Railroad Securities represents in membership over $5,000,000,000 of the $17,000,000,000 railroad securities in the hands of the public, when you consider that the one-fourth of the total investments of the great life insurance companies are composed of railroad securities; that over 30,000,000 unduplicated life insurance policies are outstanding; that every life insured has, therefore, one-fourth of the provision made after death invested in railroad securities; that 50,000,000 people, nearly one-half the country's population, have a financial interest in the railroads, you can form an idea of how important become the methods under which these properties are to be returned to their owners.

"The responsibility of Congress in providing for this large proportion of our population, together with the business interests of the country, is very great. Unless the railroads are returned under safe and sane methods, the credit structure of the country will not stand the strain and all business will suffer accordingly.

"Our membership includes nearly all the life insurance companies, and directly represents over 25,000,000 of the 50,000,000 investors in railroad securities. These include depositors in mutual savings banks, holders of life policies, individuals, trustees of estates, universities, colleges and fiduciary institutions.

"The executive committee of the securities association has been working on plans for the return of the railroads that shall be fair to all alike. The interests of the shippers and the security owners are largely identical; without adequate railroad facilities the business of the country halts; without the co-operation of the shippers a fair and adequate return cannot be had on railroad investment to afford facilities and service essential to business success.

"My visit to Chicago is in connection with the policy adopted by our association to co-operate with and ask in return the co-operation of the shipping interests in plans for the return of the railroads. Conferences have also taken place in Washington and elsewhere with representatives of the shippers and others from various sections of the country. We are gratified at the evidence of desire to co-operate for the general good. Unless we are tolerant of the views and interests of all and a spirit of 'live and let live' during these days of reconstruction prevails we shall not have learned the lesson for which the blood of millions of men has been shed.

"The conferences with the executive committee of the National Industrial Traffic League have been productive of gratifying results. We shall adopt many of the suggestions made."

Mr. Warfield said that the plans of the association, now nearing completion, will shortly be presented to the Senate committee now holding hearings at Washington.

Mr. G. M. Freer, of Cincinnati, and president of the traffic league, said last night: "The executive committee of the league is appreciative of the co-operative spirit shown by Mr. Warfield in the several days' conferences with our committee and our members, and good results must necessarily come of it.

"This is the first time the owners of the railroad properties have extended hands to the shippers and it cannot fail to produce good results. I think it can be said that the shippers of the country realize, and the war has emphasized it, that unless the railroads are given reasonable return on the investment in them and on the money required to give the shippers additional facilities and service in proportion to the increase in their business, we offer as much as those who own the railroads.

"We are considering the whole subject. The purpose of Mr. Warfield and those of our committee are not far apart. The league will send representatives to Washington to present its views to the Senate committee."

It is understood that the committee of the traffic league is opposed to the compulsory federal incorporation of the railroads and also to the creation of a single political government head for the control of the railroads.—Dow, Jones & Co., 208 S. LaSalle St., Chicago.

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Hollis Buys American Strawboard Co.

TIFFIN, OHIO, Jan. 14—The Hollis Tractor Co., Pittsburgh, a company capitalized at $2,500,000, has purchased the plant of the American Strawboard Co., and will begin the manufacture of farm tractors within 30 days.

AUTOMOTIVE MATERIALS MARKETS

Materials Market Prices

Acids:
Muriatic, lb. ..... .02 -.03
Phosphoric (85%).. .35 -.39
Sulphuric (60%), lb. .008

Aluminum:
Ingot, lb. ..... .33
Sheets (18 gage or more), lb. ..... .42

Antimony, lb. ..... .13 -.13¼

Burlap:
8 oz., yd..... .10½
10½ oz., yd..... .16½

Copper:
Elec., lb. ..... .23
Lake, lb. ..... .20 -.23

Fabric, Tire (17¼ oz.):
Sea Is., combed, sq. yd. 1.62
Egypt, combed, sq. yd. 1.30
Egypt, carded, sq. yd. 1.27
Peelers, combed, sq. yd. .97
Peelers, carded, sq. yd. ..... .95 -1.05

Fibre (⅛ in. sheet base), lb. ..... .50

Graphite:
Ceylon, lb. ..... .09 -.22
Madagascar, lb. .... .10 -.15
Mexico, lb. ..... .03¾

Lead, lb. ..... .05¼-.06

Leather:
Hides, lb. ..... .18 -.35¼

Nickel, lb. ..... .40

Oil:
Gasoline:
Auto. gal. ..... .24½
68 to 70 gal..... .30½
Lard:
Prime City, gal..2.25-2.30
Ex. No. 1, gal...1.62
Linseed, gal. 1.58-1.59
Menhaden (Dark), gal. 1.20-1.22
Petroleum (crude), Kansas, bbl. 2.25
Pennsylvania, bbl. 4.00

Rubber:
Ceylon:
First latex pale crepe, lb. ..... .57
Brown, crepe, thin, clear, lb. ..... .51
Smoked, ribbed sheets, lb. ..... .55
Para:
Up River, fine, lb. .60½
Up River, coarse, lb. ..... .36
Island, fine, lb... .54

Shellac (orange), lb.. .70 -.72

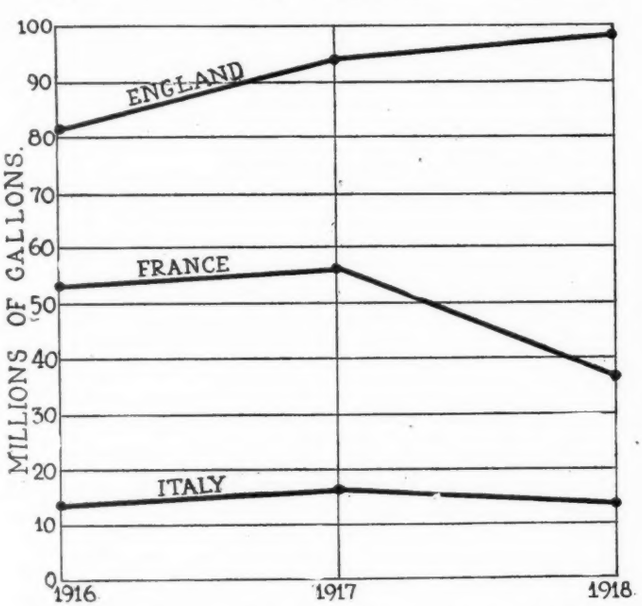
Spelter ..... .07¾-.08

Steel:
Angle beams and channels, lb. .... .03
Automobile sheet (see sp. table.)
Cold rolled, lb..... .0625
Hot rolled, lb..... .039

Tin ..... .71 -.72

Tungsten, lb. .....2.00 -2.50

Waste (cotton), lb... .12¾-.17



Exports of lubricating oil to England, France and Italy for the first ten months of 1916, 1917 *and* 1918

AUTOMOBILE SHEET PRICES

(Based on No. 22 Gage. Other gages at usual differentials)

	Primes only per 100 lbs.	Primes when seconds up to 15 per cent are taken per 100 lbs.
Automobile body stock.....	$5.95	$5.85
Automobile body stock, deep stamping	6.20	6.10
Automobile body stock, extra deep stamping	6.45	6.35
Hood, flat, fender, door and apron, or splash guard stock.....	6.05	5.95
Crown fender, cowl and radiator casing, extra deep stamping	6.55	6.45
Crown fender, cowl and radiator casing, deep stamping	6.30	6.20

Automobile Sheet Extras for Extreme Widths:
Nos. 17 and 18 over 36 in. to 44 in., 10c. per 100 lb.
Nos. 19 and 21 over 36 in. to 44 in., 30c. per 100 lb.
Nos. 22 to 24 over 26 in. to 40 in., 40c. per 100 lb.
Nos. 22 to 24 over 40 in. to 44 in., 80c. per 100 lb.

Black Sheet Extras to Apply to Narrow Widths:
Oiling, 10c. per 100 lb.
Patent leveling, 25c. per 100 lb.
Resquaring, 5 per cent of gage price after quality, finish and size extras have been added.

Seconds 10 per cent less than the invoice Pittsburgh price for corresponding primes.

Automotive Securities on the Chicago Exchange at Close Jan. 11

	Bid	Asked	Net Ch'ge
Auto Body Compay.....	5	8	..
Briscoe Motor Car, com....	..	..	..
Briscoe Motor Car, pfd.....	40	55	..
*Chandler Motor Car.....105		107	—1
Chevrolet Motor Car 154		156	+5
Cole Motor Car Co.....	90	105	..
Continental Motors, com....	8	8⅝	..
Continental Motors, pfd....	94	97	..
Edmunds & Jones, com....	19	22	—1
Edmunds & Jones, pfd.....	75	90	..
Electric Storage Bat.....	50	55	—2
Federal Motor Truck.....	33	36	+1
Fisher Body Co., com.....	36	39	..
Fisher Body Co., pfd.....	92	93¾	— ½
Ford Motor of Canada.....265		275	+40
General Motors, com.....128¾		129¾	—2¾
General Motors, pfd.....	83	85	+1¾
Hupp Motor Car, com.....	4¾	5¼	+ ¼
*Hupp Motor Car, pfd.....	85	88	+2
Kelsey Wheel Co., com.....	30	35	+1
Kelsey Wheel Co., pfd.....	88	92	+3
Manhattan Electric S., com. ..		48	..
Maxwell Motor, com.....	28	29	— ¼
Maxwell Motor, 1st pfd....	52¼	53¼	+1⅞
Maxwell Motor, 2nd pfd....	20⅞	21⅞	+2⅛
McCord, Mfg., com.....	32	35	..
McCord Mfg. pfd.....	93	96	..
Mitchell Motor Co.....	23	28	..

	Bid	Asked	Net Ch'ge
Motor Products Corp.....	40	..	..
Nash Motors Co., com.....175		200	..
Nash Motors Co., pfd.....	90	95	..
National Motor Co.....	..	8	..
Packard Motor Car, com....110		..	+3
Packard Motor Car, pfdf....	98½	..	..
Paige-Detroit Motor, com..	24¾	25¾	+1½
Paige-Detroit Motor, pfd....	8¾	9¾	..
Peerless Motor Truck.....	18	21	+1
Pierce-Arrom Mot. Car, cm.	42	43	— ½
Pierce-Arrow Mot. Car, pfd.101½		102½	—1½
Premier Motor Corp., com..	5	..	..
Premier Motor Corp., pfd...	..	75	..
Prudden Wheel Company...	15½	17½	..
Reo Motor Car Co.....	22¼	23¼	+ ¾
Republic M. Truck, com...	35	38	— ½
Republic M. Truck, pfd....	87	90	..
Saxon Motor Car, com.....	6⅞	8⅞	+ ⅜
Scripps-Booth Corp.	21	25	..
Stewart-Warner Speed. Corp.	85	87	+2¾
Stromberg Carburetor Co...	33	38	..
Studebaker Corp., com.....	51⅞	52⅞	+ ⅞
Studebaker Corp., pfd.....	92	97	..
Stutz Motor Car Co.....	49¼	50¼	..
United Motors Corp.....	33¼	35¼	+ ½
White Motor Co.....	44¾	45¾	+ ¼
Willys-Overland, com.....	25	26	— ½
Willys-Overland, pfd.....	87	88⅛	..

RUBBER STOCKS

	Bid	Asked	Net Ch'ge
Ajax Rubber Co.	68	69½	..
Firestone T. & R., com.....140		145	+1
Firestone T. & R., pfd.....	95½	100	—4½
Fisk Rubber Co., com.....	84	86	+14
Fisk Rubber, 1st pfd.....	97	100	..
Fisk Rubber, 2nd pfd.....	85	90	..
Fisk Rubber, 1st pfd. conv.100		105	+10
Goodrich, B. F., com.....	56¾	57⅛	+ ¾
Goodrich, B. F., pfd.....101½		103½	+2⅛
Goodyear T. & R., com....221		230	..
*Goodyear T. & R., 1st pfd..103		105	..
Goodyear T. R., 2nd pfd...105		107	+2
Kelly Springfield, com.....	68½	70	— ½
Kelly Springfield pfd.....	85	92	+5
Lee Tire & Rubber Co.....	22¼	22⅞	+1¼
Marathon Tire & Rubber....	..	55	..
Miller Rubber Co., com....142		148	..
Miller Rubber Co., pfd.....	96	98	..
Rubber Products Co.	..	101	..
Portage Rubber Co., com...145		149	..
Swinehart T. & R. Co.....	50	60	..
U. S. Rubber Co., com.....	77½	78	—2½
*U. S. Rubber Co., pfd.....109		110	— ½

*Ex. dividend.

Clas President of Lewis Steel Co.

MILWAUKEE, Jan. 13—Angelo R. Clas, secretary of the Falls Motors Corp., Sheboygan Falls, Wis., has resigned to become president and general manager of the Lewis Steel Co., Toledo, in which concern he recently acquired a financial interest.

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E. A. Scheu, formerly Eastern district manager of the New York branch of the King Motor Car Co., has been made sales manager with headquarters in Detroit.

—

R. M. Mann, who was in charge of the Brooklyn branch of the King Motor Car Co., has been made assistant sales manager of the home office.

—

J. R. George, formerly connected with the F. S. Carr Co., Boston, makers of automobile fabrics, has become assistant sales manager of the Barley Motor Car Co., Kalamazoo.

—

Gilbert U. Radoys has been appointed advertising manager and assistant sales manager of the Haynes Automobile Co., Kokomo. He has been previously associated with the Hudson Motor Car Co., the Packard Motor Car Co., Detroit, and with the Nordyke & Marmon Co., Indianapolis.

—

D. F. Edwards, treasurer of the Gier Pressed Steel Co., Lansing, has returned to that city and will resume his work at the plant. He held the rank of major in the purchasing and supply division at Washington.

—

Lee Anderson, lately vice-president of the Hupp Motor Car Corp., and recently director of Aircraft Production in the Detroit zone, has severed his connection with the Hupp company to become affiliated with the Theo. F. MacManus Advertising Agency. He will be succeeded in the Hupp company by Oliver C. Hutchinson, who has been supervisor of wholesale branches and sales manager.

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Milton J. Budlong has retired as vice-president, general manager and a director of the export firm of Gaston, Williams & Wigmore, New York. He has also retired as a director and vice-president of the Globe Steamship Line. His plans for the future have not been made public.

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Leo N. Burnett, having received his honorable discharge from the Navy, has returned to Detroit and is back at his old position as advertising manager of the Cadillac Motor Car Co. He relieves John A. Cleary, who has returned to Philadelphia to again become promotion manager for the Automobile Sales Corp.

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P. J. F. Batenburg, chief engineer and designer of the Four Wheel Drive Auto Co., Clintonville, Wis., has severed his connection with the company. He has not yet made any other connection.

Men of the Industry

Changes in Personnel and Position

Frankel Is Now Roller-Smith Co. Assistant Sales Manager

M. Frankel, formerly manager of the Chicago office of the Roller-Smith Co., makers of electrical instruments and circuit-breakers, New York City, has been promoted to the position of assistant sales manager. He will remain at the Chicago offices at 740 Monadnock Building and will supervise its activities, as well as those of the Cleveland office at 711 Williamson Building, and also of a new office which will be established in Detroit at an early date. The latter will be a direct factory branch.

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Rex W. Wadman has opened a western office in Chicago at 72 West Adams street.

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J. H. Ficken has resigned from the Carlisle Cord Tire Co. and will in future be connected with the Kelly-Springfield Tire Co.

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Louis Rosenberg has been appointed advertising and sales manager of the Keystone Tire & Rubber Co., New York.

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Frank B. Barnett, for 15 years Chicago manager for the Class Journal publications, has resigned that connection to assume the vice-presidency of Motor Life, New York.

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Homer Blocker, who has been assistant for the past 2 years, has been appointed advertising manager of the Republic Rubber Corp.

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Norval A. Hawkins, for 10 years sales manager of the Ford Motor Co., has resigned to give all his time to his own business interests. Mr. Hawkins was first appointed auditor of the company, and in December, 1909, was made commercial manager.

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J. M. Harris, for 5 years service manager of the Milwaukee branch of the Packard Motor Car Co. of Chicago, has been promoted to manager of passenger-car service of the headquarters in Chicago. He is succeeded by W. J. Neumyer.

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N. F. Ozburn, who has been a lieutenant in the navy, and **Dunbar Abston,** lieutenant in the Field Artillery, composing the firm of Ozburn, Abston & Co., have secured their release from active duty, and are now back in Memphis.

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Thomas L. Moore has been appointed southwestern district manager for the General Tire & Rubber Co., and will have headquarters at Dallas.

Jackson Leaves Briscoe for Auto Body

LANSING, Jan. 9—W. V. Jackson, vice-president of the Briscoe Motor Corp., of Jackson, Mich., will assume the permanent management of the Auto Body Co., this city on Jan. 15. A. C. Stebbins, vice-president of the Auto Body Co., has been acting as general manager until a suitable man to fill the vacancy can be found. Mr. Jackson has been vice-president of the Briscoe Corp. two years. He was formerly general manager of the A. O. Smith Corp., Milwaukee, and was with that concern five years.

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A. M. Whaley has been appointed southern sales manager for the General Tire & Rubber Co., with headquarters at Atlanta. He was formerly southern district manager for the Kelly-Springfield Tire Co.

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Otis H. Adams has been appointed advertising and sales promotion manager of the Connecticut Telephone & Electric Co., Meriden. Formerly he was with the Martin V. Kelly Co., and prior to that was connected with the Class Journal Co.

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James E. Wood has been appointed manager of the Cleveland office of the Roller-Smith Co., at 711 Williamson Building. He assumes the position formerly held by C. S. Ripley.

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V. L. Kloepper has been appointed chief engineer of the Automotive Department of the National Tool and Mfg. Co., St. Louis. He was formerly designing engineer for the Dorris Motor Car Corp., St. Louis.

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D. G. Caywood has been appointed special representative of the Black & Decker Mfg. Co., Baltimore. He will carry on the field work for the distribution of the Black & Decker specialized products. The appointment was effective Jan. 1. Mr. Caywood was formerly sales manager of the Brunner Mfg. Co., Utica, N. Y.

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Ford Wages Aggravate Labor Discontent

DETROIT, Jan. 13—Henry Ford's recent announcement of a $6 minimum wage scale has started a slight labor movement towards this city, which is having a tendency to aggravate present labor conditions here. Conditions at best are none too good.

Labor officials are endeavoring to stem this flow by sending warnings to other parts of the country notifying workers that there are more men than jobs in Detroit. Mr. Ford's new scale is said to be the cause of considerable adverse comment in manufacturing circles and it is rumored that an attempt may be made to file a protest with the Department of Labor at Washington.

Inasmuch as practically every business in the city was on one side or the other of the recent Ford-Newberry Senatorial fight, it is hinted that politics is playing an important part in the affair.

O'Bannon Acquires Taunton Oil Cloth

NEW YORK, Jan. 13—The O'Bannon Corp. has acquired the Taunton Oil Cloth Co., Taunton, Mass. The Taunton Oil Cloth Co. is an old established concern that has had its products on the market for more than sixty years. It makes oil cloths. The plant will be run under the personal management of Nathan Newbury, treasurer of the Taunton concern.

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Canadian Plant for Clyde

MONTREAL, Jan. 13.—Clyde Cars Co. of Canada has opened a Canadian plant for the assembling and distribution of Clydesdale trucks for Canada and the Imperial Colonies. It is at 73-81 St. Paul Street, Toronto. Clydesdale trucks are constructed in accordance with the subsidy scheme specifications of the British War Office.

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Detroit Office for Roller-Smith

NEW YORK, Jan. 13—The Roller-Smith Co. has opened a Detroit office in the new Telegraph Building. It is in charge of C. H. Nicholson, formerly connected with the Chicago office of the company.

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Canadian Distributer for Moline Tractor

MOLINE, ILL., Jan. 13.—The Moline Plow Co. has contracted with the Willys-Overland, Toronto, for the distribution of Moline tractors and implements for the Dominion of Canada. Overland branch houses will carry a stock of repair parts.

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Automotive Products Co. to Change Name

DETROIT, Jan. 9—Because two other accessory companies are doing business under a like name, papers have been filed to change the name of the Automotive Products Co., incorporated last week, to that of Autoware Corp.

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Milwaukee to Unite Motor Trades

MILWAUKEE, WIS., Jan. 13—Plans which have for their purpose the amalgamation of all sections of the motor car and supply industry and trade of Milwaukee under the leadership of the Milwaukee Automobile Dealers, Inc., are being completed by a special committee created a short time ago, with Alfred Reeke as chairman. It is hoped to complete the organization so that it will be one of the results of the annual Milwaukee show, Jan. 24 to 30.

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"Shelko" Accessories and Supplies

MADISON, Jan. 13—L. F. Schoelkopf, head of the L. F. Schoelkopf Co., distributer of the Ford in Dane County, has recently created a manufacturing and jobbing department in accessories and supplies, which is marketing a line of goods under the brand of "Shelko."

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Dividends Declared

The Kelly-Springfield Tire Co., $1 quarterly, common.

Nash Motors Co., $10 a share, common.

Current News of Factories

Notes of New Plants—Old Ones Enlarged

Temporary Receivership for Interstate Tractor Co.

WATERLOO, Jan. 14—The Interstate Tractor Co. has been placed in the hands of receivers. The court appointed as receivers Floyd L. Chamberlain, president of the Chamberlain Machine Works, and Howard S. Miller of the Cedar River Sand & Gravel Co. The receivership is considered a temporary one and the first step toward reorganizing, with the object of continuing the business. The company is held to be solvent with gross assets of approximately $2,000,000.

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More Capital for General Tire

AKRON, Jan. 13—The General Tire & Rubber Co. has increased its capital stock from $1,000,000 to $2,500,000. The following officers have been re-elected: President, M. O'Neil; vice-president, W. O'Neil; secretary, W. E. Fouse; treasurer, Charles Herberich; directors, the officers and T. F. O'Neil, G. F. Burkhardt, W. L. Beckley and J. A. Diebolt.

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Manitowoc Plating Will Add

MANITOWOC, WIS., Jan. 13—The Manitowoc Plating Works, Manitowoc, Wis., is contemplating the erection and equipment of additions costing about $15,000 early next spring. W. J. Wachowitz is manager.

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Highway Trailer Co. 1918 Financial Report

EDGERTON, WIS., Jan. 13—The Highway Trailer Co., at its annual stockholders' meeting, reported unfilled orders in excess of $105,000, while its 1918 business amounted to more than $500,000, consisting largely of Government contracts for special military trailers. The balance sheet showed assets of $222,000, including enlargements and improvements costing $25,000 made during the past year. A total of $49,279.60 was paid for salaries and wages. An interesting item is the disbursement of $14,879.80 for express and freight. The company declared a 7 per cent dividend on a capital of $179,000, payable Feb. 1. President James W. Menhall and other officers and directors were re-elected.

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George Wurtz, for several years general Wisconsin traveling representative of the mechanical goods department of the Diamond division of the B. F. Goodrich Co., Akron, O., has been promoted Eastern manager of the same department, with headquarters in Pittsburgh.

Acme Adds to Personnel

CADILLAC, MICH., Jan. 13—The Acme Motor Truck Co. has made the following additions and changes in its organization. H. L. Browne has joined the sales force, and will act as factory representative in Colorado, Wyoming, New Mexico and Utah. He was formerly connected with the Service Motor Car Co. J. E. Bowles, who, for the past year has been special representative in the middle western states, will be transferred to the Pacific Coast, with headquarters at San Francisco, commencing at once. George P. Gould will act as factory representative in Maine, Massachusetts, New Hampshire and Vermont.

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New Machine Tool Company for Green Bay

GREEN BAY, Jan. 13—The Conradson Machine Tool Co. has been organized at Green Bay, Wis., with a capital stock of $300,000 to manufacture turret lathes and other machine tools.

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Klumb Engine & Machine Co. Dissolved

SHEBOYGAN, WIS., Jan. 13—The Klumb Engine & Machine Co., which disposed of its plant and equipment some time ago, has discontinued business and the corporation has been dissolved.

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Ford to Use Power Dams

DETROIT, Jan. 13—The Henry Ford interests have secured options on nearly all power dam locations on Rouge River from Dearborn to Northville. There are three power dams at Northville, three between Northville and Plymouth, one at Plymouth, one at Newberg and one at Nankin. Utilization of all power of nine or ten dams is contemplated, it is said.

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Ford Branch Managers Meet

DETROIT, Jan. 13—Branch managers of the Ford Motor Car Co. were in annual convention here Jan. 7 to 11. Practically every sales district in the United States and South America was represented. Managers were unanimous in declaring the 1919 business outlook was unusually promising, and a number predict that the end of the season will see all previous sales records shattered.

The following branch managers were present:

R. S. Abbott, Atlanta; W. C. Anderson, Chicago; O. L. Arnold, Pittsburgh; L. C. Block, Philadelphia; H. M. Buckley, Fargo, N. D.; J. A. Deignan, Oklahoma City; H. C. Ethridge, Jacksonville; A. W. Gilpin, Milwaukee; C. L. Gould, Omaha; B. L. Graves, Los Angeles; E. H. Hampton, Buenos Aires, Argentine, S. A.; J. A. Handin, Salt Lake City; J. J. Harrington, Boston; Charles J. Hendy, Denver; C. C. Hildebrand, Minneapolis; Joseph W. Holt, Charlotte, N. C.; R. P. Jones, Washington; J. S. Keown, Louisville; A. J. Langford, Dallas; J. B. Lund, San Francisco; W. M. MacDonald, Houston; F. E. McClure, Cleveland; W. S. McNamara, Portland, Ore.; P. F. Minnock, Des Moines; H. K. Munroe, New Orleans; R. S. Neeley, New York City; G. C. Nichols, Cincinnati; Gaston Plantiff, Long Island City; R. P. Rice, Kansas City; E. L. Rockelman, Seattle; N. J. Schmucker, Jr., Scranton; G. B. Tyler, Buffalo; N. Udell, Indianapolis; C. S. Williams, Memphis; J. J. Wright, St. Louis.

Calendar

ENGINEERING

S. A. E. Meetings

Feb. 4-6—New York. Winter Meeting. Society of Automotive Engineers, Engineering Societies' Building.

Feb. 6—Victory Dinner, Hotel Astor, New York.

Feb. 5—Minneapolis Section, S. A. E.—Hotel Radisson. "Radiator Cooling Fans."

March 5 — Minneapolis Section, S. A. E.—Hotel Radisson. "Tractor Service and Sales."

April 2—Minneapolis Section, S. A. E.—Hotel Radisson. "Implements Designed for Tractor Belt Power and Their Characteristics."

MOTOR SHOWS

Jan. 11-18—Los Angeles, Cal. Automotive Exposition.

Jan. 15-18 — Spokane, Wash. Progressive Automotive Show in dealers' salesrooms. Auspices of Spokane Automobile Chamber of Commerce.

Jan. 16-18—Dallas, Tex. First Annual Mid-Winter, Adolphus Hotel Annex. Dr. W. G. Langley, Manager.

Jan. 20-25 — Shreveport, La. Shreveport Automobile Dealers' Assn. Henry B. Marks, Manager.

Jan. 20-25 — Hartford, Conn. Broad Street Armory, Auspices of Agricultural Interests.

Jan. 24-30 — Milwaukee, Wis. Eleventh Annual, Milwaukee Automobile Dealers, Inc., Auditorium. Bart J. Ruddle, Manager.

Jan. 25-Feb. 1—Chicago. Passenger cars, Coliseum.

Feb. 1-15—New York. Automobile Dealers' Assn. Charles A. Stewart Manager, Hotel Woodward, Broadway and 55th St.

Feb. 3-6 — Chicago. Trucks, Coliseum.

Feb. 5-8—Fargo, N. D. North Dakota Automobile Dealers' Assn., Auditorium.

Feb. 10-15—San Francisco, Cal. Third Annual Pacific Automobile Show, Motor Car Dealers' Assn. of San Francisco. Exposition Auditorium. G. A. Wahlgreen, Manager.

Feb. 10-15—Rochester, N. Y. Rochester Automobile Trades Assn., Exposition Park. George C. Donahue, Manager.

Feb. 15-22—Newark, N. J. N. J. Auto Exhibition Co. Calude Holgate, Manager.

Feb. 15-22 — Cleveland, Ohio. Cleveland Auto Show Co. Fred H. Caley, Manager.

Feb. 15-22—Minneapolis, Minn. Minneapolis Auto Trade Assn. Walter B. Wilmot, Manager.

Feb. 15-22—Albany, N. Y. Albany Automobile Dealers' Assn. State Armory.

Feb. 17-22—St. Louis. St. Louis Auto Mnfrs. & Dealers' Assn. Robert E. Lee, Manager.

Feb. 17 - 22 — Louisville, Ky. Louisville Auto Dealers' Assn.

Feb. 17-22—Des Moines, Iowa. Tenth Annual, Des Moines Automobile Dealers' Assn. C. G. Van Vliet, Manager.

Feb. 17-22 — Pittsfield, Mass. Pittsfield Automobile Dealers' Assn., State Armory. James J. Callahan, Manager.

Feb. 17-22 — Passenger Cars; Feb. 24-27, Trucks—South Bethlehem, Pa. Lehigh Valley Auto Shows Co. J. L. Elliott, Manager.

Feb. 17-22—Grand Rapids, Mich. Grand Rapids Automobile Business Assn. E. T. Conlon, Manager.

Feb. 18-22—Baltimore, Md. Baltimore Automobile Dealers' Assn. and Automobile Club of Maryland, Fifth Regiment Armory. H. M. Lucius, General Manager.

Feb. 22-Mar. 1—Hartford, Conn. Hartford Automobile Dealers' Assn., Inc., Broad Street Armory. Ben F. Smith, Manager.

Feb. 23-March 1—Cedar Rapids. Auditorium, Automobile Dealers' Assn.

Feb. 24-March 1—Kansas City, Mo.—Kansas City Motor Dealers' Assn. E. E. [illegible]ke, Manager.

Feb. 24-Mar. 1 — Springfield, Mass. Automobile Dealers' Assn. Harry W. Stacy, Manager.

Feb. 24-Mar. 1—Portland, Ore. Ninth Annual, Dealers' Motor Car Assn., Auditorium. M. O. Wilkins, Manager.

Feb. 27-March 6—New York Aircraft Exhibition by Aircraft Manufacturers' Association, Madison Square Garden.

March — Scranton, Pa. Thirteenth Regiment Armory, Scranton Automobile Assn.

March—Utica, N. Y. Utica Motor Dealers' Assn. W. W. Garabrandt, Manager.

March — Great Falls, Mont.—Montana Automobile Dis[illegible]uters' Assn.

March—Philadelphia, Pa. Philadelphia Automobile Trade Assn. Passenger cars.

March 1-8—Detroit, Mich. Detroit Automobile Dealers' Assn. H. H. Shuart, Manager.

March 3-8—Columbus, O. Columbus Automobile Show Co., Memorial Building. W. W. Freeman, Manager.

March 3-8—Buffalo, N. Y. Buffalo Automobile Dealers' Assn.

Mar. 5-8—Quincy, Ill. Quincy Automobile Trades Assn., Armory.

Mar. 10-15—Paterson, N. J. Paterson Automobile Trade Assn., Fifth Regiment Armory. H. MacGinley, Show Manager.

March 10-15—Syracuse, N. Y. Syracuse Automobile Dealers' Assn. Harry T. Gardner, Manager.

Mar. 10-15—Omaha, Neb. Fourteenth Annual. Omaha Automobile Trade Assn., Auditorium. Clarke G. Powell, Manager.

Mar. 12-19—St. Joseph, Mo. Sixth Annual, St. Joseph Automobile Dealers' Assn.

March 15-22 — Boston, Mass. Boston Automobile Dealers' Assn. Chester I. Campbell, Manager.

Mar. 15-22 — Harrisburg, Pa. Harrisburg Motor Dealers' Assn., Overland Warehouse. J. Clyde Myton, Manager.

Mar. 22-29—Pittsburgh Automobile Dealers' Assn. of Pittsburgh. John J. Bell, Manager.

March 22-29, Passenger Cars; April 1-5, Trucks—Brooklyn. Brooklyn Motor Vehicle Dealers' Assn. I. C. Kirkham, Manager.

Third week March—Trenton, N. J. Trenton Auto Trade Assn. John L. Brock, Manager.

April 5-12—Montreal, Can.—National Motor Show of Eastern Canada, Victoria Rink. T. C. Kirby, Manager.

Not decided—Bridgeport, Conn. Auspices of City Battalion. B. B. Steiber, Manager.

Not decided—Indianapolis, Ind. Indianapolis Auto Trade Assn. John B. Orman, Manager.

TRACTOR SHOWS

Jan. 20-25 — Hartford, Conn. Broad Street Armory.

Feb. 24-Mar. 1—Kansas City, Mo. Fourth Annual Tractor Show. Sweeney Building, Kansas City Tractor Club. Guy H. Hall, Sec.

Feb. 18-22—Wichita, Kan. Annual Mid-west Tractor and Thresher Show, Wichita Tractor and Thresher Club. Forum.

CONVENTIONS

Feb. 4-6—New York. Meeting Society Automotive Engineers.

Feb. 25-28—New York. Sixteenth Annual Convention. American Road Builders' Assn.

Lober Mfg. Co. Enlarges

TOLEDO, Jan. 9—The Lober Radiator & Mfg. Co. has been incorporated with a capital stock of $50,000 to take over the Lober Art Brass & Specialty Co. The present plant is to be enlarged and 5000 ft. of floor space and 100 employees added. The concern made airplane radiators during the war.

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Motor Vehicle for Every 18 Persons

(*Continued from page* 102)

For four years, Iowa has held first place. She started out after a record in 1915 by registering a motor vehicle for every 16 persons and each year this has been consistently bettered. In 1916 it was 13, and Nebraska tied the record. Prior to 1916, California was the leader, having a motor vehicle for every 27 in 1912 and for every 19 in 1914. Nebraska took first place in the year between, 1915, registering a vehicle for every 25 persons. It is hardly fair to give the place that year to the District of Columbia, which had a vehicle for every 21 persons.

Last year there was one motor vehicle for every 20 persons in the United States.

Two years ago, only five states boasted registering more than 200,000 cars each. Last year eight states went over this figure. This year there are ten states well over 200,000 and one more that has nearly reached this total. Two years ago, not a single state had reached the 300,000 mark; even New York was well below it. Last year, New York, Illinois, Ohio and Pennsylvania topped 300,000. This year Iowa went into the 300,000 class and two states, New York and Ohio, graduated out of it into the 400,000 class.

To-day, eighteen of the forty-nine states and territories can count their motor vehicles in figures of six digits, which is two states more than last year.

Three National Tool Transmissions

ST. LOUIS, Jan. 9—The National Tool & Mfg. Co., is now building three new models of automobile transmissions, designed for small, medium, and heavy types of passenger cars.

Simpson Now Victory Truck

ST. JOSEPH, MO., Jan. 13—The Simpson Truck Co. has changed its name to the Victory Truck Co., and has increased its capital stock from $50,000 to $100,000.

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Starkweather-Snook Open Chicago Office

FORT MADISON, IOWA, Jan. 13—The Starkweather-Snook Corp., manufacturer of the S. & S. shock absorbers, has opened a branch office and warehouse at 1402 South Michigan Avenue, Chicago, with Chas. Snook in charge. The main office and factory will continue at Fort Madison and the Chicago branch will carry a complete stock.

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Torbensen Axle Co. Erects New Building

CLEVELAND, Jan. 15—The Torbensen Axle Co. have started work on a new two-story brick, steel and mill constructed building, 100 x 140, as an addition to its present buildings, to cost about $75,000. Completion of the building is scheduled within 45 days.